



NAVIGATION

OF

HUDSON'S BAY.

OTTAWA:

PRINTED BY MACLEAN, ROGER & CO., WELLINGTON STREET.

SIR JOHN MACDONALD,
in a not otherwise
intemperate or unfair letter to a Victoria
paper, accuses the late Minister of Public
Works of suppressing a map intended to
accompany the Railway Report of 1878, and
“showing the character of the country in
“the neighbourhood of Slave Lake, Fort
“St. John, Fort McLeod, and Pine River.”
Mr. Macdonald leaves it to be clearly
understood that he accuses Mr.
Mackenzie of keeping the map back
for the deliberate purpose of in-
juring the Pine River route. Had he
made enquiry as to the real reason for sup-
pressing the map he would have been spared
the unpleasantness of a public correction.
He could have learned without any difficulty
that the map was kept back because, having
been prepared by Mr. Sandford Flem-
ing's assistants in that gentleman's absence,
it was condemned on his return to Ottawa
as inaccurate. It is to be regretted that
the map could not be issued, as it would
have been an important contribution to the
geography of the North-West; but there is
not the slightest excuse for Senator Mac-
donald's rash accusation respecting the
affair. *Monte Carlo 3 May 1881*







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INTRODUCTION.

To the Right Honorable

Sir JOHN A. MACDONALD, K. C. B., &c., &c.

Minister of the Interior.

The undersigned has the honour to bring under the notice of the Minister of the Interior, in the following pages, the question of the practicability of establishing an ocean route for trade purposes between Europe and the North-West of the Dominion, via Hudson's Straits and Bay.

The Minister will recognize the evidence of Professor Hind as that given before the Committee of the House of Commons on immigration, during the last Session of Parliament, and which appears in the report of the Committee. The undersigned, however, in view of the extent to which such a route, if found feasible, would contribute towards the speedy settlement of the lands of the Dominion, has had the said evidence reprinted in a form more convenient for reference; and more likely to obtain for the subject the consideration which its importance demands.

An additional paper recently received from Professor Hind, bearing on the whale fishery of Hudson's Bay, conducted by citizens of the United States, is contributed by him in support of the opinions previously expressed respecting the valuable fishing industries which would probably be developed upon a more thorough knowledge being obtained of that great inland sea.

A letter from Mr. C. Horetsky, formerly of the Hudson's Bay Company's service, is also given, which sustains generally the conclusions arrived at by Professor Hind respecting the probable feasibility of the communication indicated, and which possesses value from the personal experience of the writer, acquired during a residence of some five years at Moose Factory, situate on the southerly shore of James' Bay.

The undersigned has had sent him for perusal, by W. N. Fairbanks, Esq., of Emerson, Manitoba, formerly of Halifax, N. S., a letter received by him from Messrs. Job Brothers, & Co., prominent merchants in St. Johns, Newfoundland, written in reply to enquiry on the subject, in which the firm mentioned state that they have no doubt of the practicability of navigating the Straits and Bay with proper steamers during the months of June, July, August, September and October.

An inspection of the accompanying map of the Dominion, published principally to illustrate the subject under consideration, shows that by such a communication, should the same be found feasible, assuming a railway to be in operation westerly up the valley of the Nelson River, immigrants may be placed on land at Prince Albert Settlement on the Saskatchewan, more cheaply and within a few hours of as short a time as they can be set down at London in Ontario, by the present lines of travel either through Montreal or New York.

This fact is of great importance, and it is further claimed that this northern route would for climatic reasons, possess special advantages for the transmission of grains and meat.

The undersigned thinks the subject of sufficient moment to justify the Government in taking steps to test the length of the season, and the character of the navigation in Hudson's Bay and Straits; and respectfully urges on the Minister the expediency of despatching, during the ensuing spring, a steamer properly equipped and commanded, with that view.

So far as the valley of the Nelson River is concerned, the exploration thereof which it is understood has been effected by Professor Bell, of the Geological Survey, during the past season; whose report on the subject will be eagerly looked for, will probably have determined its general adaptability for railway construction.

The important questions to be determined are:

1. What period of the season—between what dates—may the Straits and Bay be regarded as open for vessels?
2. Supposing a properly constructed and found fleet of vessels—what is the character of the risk which would be involved in the navigation during such period?

Should there prove to be even a four months' navigation on this route, and especially should such period extend sufficiently into the fall to permit of moving to market the preceding harvest, it would be difficult indeed to take an over sanguine view of the future of the magnificent territories now lying dormant in the North West, the property of the Dominion. Such a discovery would prove to be of the greatest value in connection with the construction of the Pacific Railway, inasmuch as it would afford an unbounded stimulus to the settlement on Free Grant lands in the North-West, and thus lead to speedy and satisfactory sales of the alternate blocks proposed by the Act to be set apart to aid in the construction of the work.

A scheme suggested by Professor Hind on the subject of colonizing the North-West from the redundant population of the mother country, by joint action on the part, respectively, of the Dominion and the Savings Banks in Great Britain and Ireland under Imperial control, will be found with the papers. As the subject appertains to another Department, the undersigned expresses no opinion thereon, but ventures, respectfully, to submit the Professor's scheme, which will be found replete with valuable and interesting statistical information, for the consideration of the Honorable the Minister of Agriculture and Immigration.

J. S. DENNIS,
Surveyor General

DEPARTMENT OF THE INTERIOR,
DOMINION LANDS OFFICE,
11th November, 1878.

NAVIGATION OF HUDSON'S BAY.

PORT NELSON, April 17th, 1878.

Professor HENRY YOULE HIND appeared before the Committee, and in answer to a question by the Chairman, stated that his profession was that of a Geologist.

By the Chairman :—

1 Q. Has your attention ever been specially directed to the establishment of a communication by sea with the North-West Territories, *via* Hudson's Straits and Bay? If so, will you state to the Committee in general terms, the conclusions at which you have arrived?

A. Some time after my return from the "Assiniboine and Saskatchewan Exploring Expedition," in 1858, I read a paper on "Central British America" before the "Statistical Society of London," a copy of which is herewith submitted. In that paper I made reference (1) to the communication between Hudson's Bay and the valley of the Saskatchewan, noticing particularly the altered conditions which the general employment of steam had introduced in the navigation of ice-encumbered seas. The subject excited some discussion, generally of a favourable character to the plan proposed. Subsequently, in 1876, when in Newfoundland and on the coast of Northern Labrador, I embraced the opportunity of making enquiries respecting the operations of sealing steamers, the extent and nature of the ice on the northern Labrador shores, and at the entrance to Hudson's Bay, &c., &c., the result of these enquiries satisfied me that the objections urged against the ice in Hudson's Straits and Bay, as forbidding the idea of continuous communication with the Atlantic Ocean for more than six weeks in the year, were quite overcome by the experience gained during the past few years, in the construction and management of the modern sealing steamer, combined with the use of the magneto-electric light. On the 18th of this month I received from Colonel Dennis, Surveyor-General, a note of enquiry asking me to state briefly the nature of the conclusions at which I had arrived on the subject generally. I submit herewith a copy of my reply.

(1) "In contemplating the future of Central British America one important feature appears to be neglected, if not entirely overlooked. While Lake Winnipeg is 2,500 miles from the sea board of the Gulf of St. Lawrence, and lies exactly in the centre of the American continent under the 51st parallel, its northern extremity is only 380 miles from the tide waters of Hudson's Bay."

"The mouth of the Saskatchewan is as near to the open sea as Fort Garry is to the western extremity of Lake Superior. The passage from Norway House, at the northern extremity of Lake Winnipeg, to Hudson's Bay, is made in nine days with loaded boats. It is not unreasonable to suppose that by the introduction of tramways over the portages the journey may be made in four days, thus bringing Lake Winnipeg within four days of the sea, yet the nature of the communication now followed is such that it would not admit of vessels much larger than freighters' boats being employed. The navigation of Hudson's Bay for sailing vessels is safe for a period not exceeding six weeks—for steamers it may be double that time. Hitherto the mode of communication adopted by the fur traders between Norway House and Hudson's Bay has been sufficient for the exigencies of the fur trade; it is not at all improbable that more easy means of communication with the sea board exist than those which are now pursued. Under any circumstances, it is a fact of the highest importance that Lake Winnipeg is actually within a week's journey of the ocean, over a natural road by which troops have already entered and departed from Central British America. It is more than probable that whenever the necessity arises, the communication between Lake Winnipeg and Hudson's Bay, and thence to the Atlantic, by the aid of steamers, will be made easy and speedy for at least three months in the year."

"The outlet by which the waters of the Saskatchewan and Lake Winnipeg reach the sea is Nelson River. The chief reason which induces the Hudson's Bay Company to send their cargoes of furs to York Factory by Hayes River is stated to be the difficulties and dangers of the tracking ground on the banks of Nelson River, arising from impending masses of ice on the precipitous banks. The head of tide-water in Nelson River may yet become the seat of the Archangel of Central British America, and the great and ancient Russian northern port—at one time the sole outlet of that vast empire—find its parallel in Hudson's Bay."

* "Hind on the Commercial Progress and Resources of Central British America. Statistical Society's Journal, March 1864."

" WINDSOR, N.S., 22nd March, 1878.

" DEAR COLONEL DENNIS.—Your very interesting letter of the 18th inst., is just received, and I hasten to reply to the enquiry as to whether I have any information to communicate, gathered on the Labrador coast or elsewhere, as to the facilities for effecting commercial communication with the North-West Territories *via* Hudson's Bay.

" The subject is one to which I adverted in a paper read May, 1864, or 14 years ago, before the Statistical Society in London, a copy of which I now send. You will find the reference at page 101. I still consider that York Factory will become 'the Archangel of the West.'

" During the past three years my views on the subject have undergone a progressive change, all tending towards confirming the opinion of the adoption ultimately of the Hudson's Bay route as a great commercial highway between Central British America, and Europe. The facts which have led to this decided opinion are briefly as follows:—

" 1st. The general and successful employment of large steamers properly constructed for ice-encounter, by the Newfoundland, British and Norwegian sealers. The safety of these vessels, and the experience acquired in the management of a steamer in ice-encumbered seas.

" 2nd. The present cheapness and easy management, on board a steamer, of the magneto-electric light, for use on such steamers, and for temporary powerful light-house purposes.

" 3rd. The alleged discovery, on high authority, of lignite coal over wide areas from Cape Walsingham to Frobisher Bay, just north of Hudson's Straits, as well as on the West Greenland Coast.

" 4th. The better knowledge now possessed of the proper mode and time for navigating Davis' Straits in approaching Hudson's Straits.

" 5th. The great fishing resources of Davis' Straits in and towards Frobisher Bay.

" 6th. The sources of the ice drift on the Labrador coast, its course in Hudson's Straits, and the mode of avoiding it in summer and autumn, or crossing it where it is narrowest.

" 7th. From all I have gathered respecting the navigation of Hudson Straits and its approaches from the east, there appears to be no difficulty in navigating them from July to October with a sealing steamer, especially if provided with a magneto-electric light for use in September and October.

" When we consider that York Factory is actually nearer to Liverpool than New York, it surely becomes a question of the greatest moment to determine how far existing information would warrant minute enquiry into this very important subject. As the result of a prolonged but desultory study of the question, I have no doubt that continuous and safe navigation by steamers, constructed as sealing steamers are, can be carried on between Port Nelson and Liverpool for at least four months in the year—that is, from Liverpool to Liverpool again, leaving three months, or perhaps a little more, for Hudson's Bay.

" Such a navigation would, in effect, bring a thousand miles of sea coast line, now included in Ontario and Keewaydin, into direct water communication with the outer world, and develop new interests for the North-West, apart from the outlet it would afford to its grain. The lignite coal on the west side of Davis' Straits is of importance in this connection.

" I enclose a tracing of a map prepared some time since, showing the alleged position of some of the coal beds, and the two routes to Liverpool.

" It is needless to say that the proper amplification of the points advanced in preceding paragraphs would occupy considerable time. I have marked in pencil Back's drift in H. M. S. "Terror," imbedded in ice, from Cape Comfort, Southampton Island, past Nottingham Island, and into Hudson's Straits, from the 1st September,

1836, to July 17th, 1837. The literature on the physics of these waters is not condensed, and must be collected and arranged from many different but available sources."

"Yours very sincerely,

(Signed) HENRY Y. HIND."

Colonel DENNIS,
Surveyor-General
Ottawa.

2 Q. Where would be your point of departure in Hudson's Bay, and what are the objects proposed to be gained by the route you contemplate?

A. On the 15th August, 1612, Captain Thomas Button, seeking for a harbour on the west coast of Hudson's Bay in which he might repair damages incurred during a severe storm, discovered the mouth of a large river which he designated Port Nelson, "from the name of the master of his ship, whom he buried there" (1.)

Port Nelson River, or as now termed, Nelson River, is the outlet through which drains the whole of the rivers and lakes included within the basin of Lake Winnipeg, extending from the Rocky Mountains on the west to within one hundred miles of the shores of Lake Superior on the east, and covering a drainage area of about 360,000 square miles.

Port Nelson is about eighty miles nearer to Liverpool, *via* Hudson's Straits, than is New York. It is at the mouth of a river of the first class, carrying a body of water double that of the north and south branches of the Saskatchewan combined, and it reaches the sea through a narrow depression in the Laurentides, having a descent of about twenty inches in a mile, or, in round numbers, seven hundred feet in a little more than four hundred statute miles from the spot where it debouches from Lake Winnipeg.

Port Nelson, moreover, is about the same distance from the edge of a vast fertile region in the North-West, exceeding two hundred millions of acres in area, as Quebec is from Toronto.

For more than two hundred years from two to five sailing vessels, on an average, frequently with war ships convoying them, have sailed annually from Europe and America to Port Nelson, or other ports in Hudson's Bay, and returned with cargoes the same season *via* the only available route, Hudson's Straits.

In view of the growing interests of the North-West, from whatever point these may be regarded, the time for enquiry has arrived, whether communication with the Atlantic Ocean, with Port Nelson as a starting point, may not be made safe, speedy and economical. The enquiry has become a natural consequence of the extended knowledge now made public respecting the vast area in the North-West, suitable for grain growing and for pasturage, which the Government surveys have supplied. It is also encouraged by the great changes which have taken place during the last ten years in the prosecution of the sealing industry, which have established the fact that properly constructed vessels of large capacity are, in skilful hands, perfectly adapted to push their way through ice-encumbered seas. It has been pressed forward by the new industry, so rapidly rising into importance, which gives additional wealth to the prairies of the west and south-west in the United States, by the European demand for their live products as well as for their grain.

The establishment of a cheap and speedy means of communication between the North-West and the open Atlantic *via* Hudson's Straits, would not only secure the rapid settlement of Manitoba, but open to successful immigration a fertile area twenty times as large as that Province. The proximity of this vast extent of country to its own seaboard would, under such conditions, also secure the carrying trade of its own productions under one and the same flag.

(1.) A voyage to Hudson's Bay by the "Dobbs Galley" and "California," in the years 1746 and 1747. By Henry Ellis. London, 1768.

The following abstract reviews in succession the leading points in this enquiry, namely:—

- I. The geography of Hudson's Straits.
- II. The character of the navigation in Hudson's Straits.
- III. The ice in Hudson's Straits and Bay, and on the Labrador.
- IV. Nelson River.
- V. Port Nelson as an objective point.
- VI. The natural marine resources of Hudson's Straits and Bay.
- VII. Manitoba and the North-West.

HUDSON'S STRAITS AND BAY.

THE GEOGRAPHY OF HUDSON'S STRAITS.

3 Q. Will you give the Committee a general description of the geography of Hudson's Straits, and of the obstructions which ice is stated to offer to its navigation?

A. The most recent Admiralty map of Hudson's Straits exhibits a want of full information regarding the coast lines on both sides of the Straits. The remark made by Lieut. Chappell in 1814, that the southern shore has never been explored, is true at the present day. This officer states that "all this coast, as well as the northern shore, is fringed with islands; the principal of which are King George, Prince of Wales, Maiden Pass and Mannils Islands; and they doubtless afford shelter to many fine harbours." (1.) The latest charts still show a disconnected coast line here and there for thrice hundred miles, and the fringe of islands, noticed by Chappell, is not recorded on any published chart. This officer asserts, that the "Rosamond," convoying the Hudson's Bay Co. ships, in 1814, was piloted through Hudson's Straits by the means of a private chart supplied by the chief mate of the "Prince of Wales," one of the ships under convoy. No copy of this chart could be obtained, and Chappell found it impossible to procure access to valuable geographical information in the possession of the officer of the H. B. Co.'s ship. But it is to be observed that he expresses the opinion that the chief motive for this concealment was of a personal character, and did not emanate from any disposition on the part of the Company to withhold information. The knowledge obtained by experience, and, in some instances, probably conveyed for a consideration from one to another, by the officers in charge of the Company's ships, was the means by which they preserved lucrative situations, and was, naturally, jealously guarded.

Captain Sherard Osborn, R.N., brought under the notice of the Royal Geographical Society of London, in 1863, a curious instance of the valuable information possessed by the captains of whalers in Davis Straits and Baffin's Bay and the Northern Seas generally. He was assured by one of these whaling captains, that everyone of the so-called Sounds in a certain part of Davis Straits and Baffin's Bay, were Bays, not Sounds. Upon being asked why he did not make the truth known, his answer was "my knowledge is money." (2.)

An Admiralty chart of 1853, corrected up to December 1872, retains all the errors connected with the *meta incognita* of Queen Elizabeth and the so-called Frobisher Strait, now known to be a Bay. The chart published in 1875 has not expunged the *meta incognita*, but it has transformed Frobisher Strait into a Bay.

(1.) Narrative of a voyage to Hudson's Bay in H.M.S. "Rosamond," by Lieut. Ed. Chappell, R.N., London, 1817.

(2.) Proceedings of the Royal Geographical Society, April 13th, 1863.

Commander Becher states that the western entrance to the Straits is not more than 15 leagues, or 45 miles in width; but this must include only the open water between Cape Best and Button's Islands, which are at least ten miles from the mainland of Labrador, making the entire width of the main entrance to the Straits, 55 miles. Between Button's Islands and the mainland there is a group of eleven islands, two of which are large, and the channels between these are four in number. Cape Chidleigh, or Chudleigh, is represented to be on Chudleigh Island, and of the nature of the passage between this Archipelago and the coast of Labrador, no reliable information appears to be published.

Cape Best, which forms the northern limit of the main entrance to the Straits, is on Resolution Island; but between this Island and the mainland, or Terra Nivea, on the north side of the Strait, there is a wide passage represented on the chart to be about 10 miles in breadth. There are, therefore, no less than three entrances into Hudson's Straits, the first and the most northerly lying between Resolution Island and the East Bluff, styled on Captain Becher's chart, "Gabriel Strait," (1) about 10 miles in breadth; the second or the main entrance, between Cape Best, forming the southern extremity of Resolution Island and the Button Islands, 45 miles in breadth; and, lastly, the several channels lying between the islands on the coast of Labrador, of which four are marked within a breadth of 10 miles. It will be shown subsequently that the east entrance to the Strait once passed, the navigation is comparatively easy to the westward; and as the difficulty of effecting an entrance in the summer with sailing vessels arises from drifting floe ice, the establishment of a signal station on Resolution Island, and one on one of Button's islands, to indicate the position of the open channels, is of the first importance in the navigation of these waters early in the season. Winds may press the floe ice on the south or north shore, according to their direction, and while the north passage may be closed by westerly winds driving the ice on to the north-easterly coast, the south or Labrador shore may be free from ice and open water exist early in June. On the other hand, northerly winds will drive the ice to the southern or Labrador shore, and the channels on the north side, or near Cape Best, or through Gabriel Straits, be open. Once within the entrance the navigation becomes comparatively easy.

Lieut. Chappell states as a reason for selecting the northern passage close to Resolution Island, "that entering Hudson's Strait, it is a necessary precaution to keep close in with the northern shore, as the currents out of the Hudson's and Davis' Straits meet on the south side of the entrance, and carry the ice with great velocity to the southward, along the coast of Labrador." (2). It is well known, however, that the direction of the ice drift is much affected by prevailing winds, and that meteorological conditions have much influence in determining the position of the floe ice. Icebergs which can be avoided by a steamer are not much affected by winds, being directed by deep-seated currents, which, in Hudson's Straits, according to Sir Edward Parry, carry the bergs to and fro twice as fast as the floe ice.

The narrowest part of the Strait is opposite North Bluff, near the upper Savage Islands, where Parry estimated it to be 14 leagues or 42 miles across.

The length of the Strait is about 500 miles from Cape Best on Resolution Island, to the islands at the entrance to Hudson's Bay. The depth of water, as far as ascertained, is considerable, particularly on the North Shore. In the centre it often exceeds three hundred fathoms. The North Shore is bold, with little appearance of vegetation; the South Shore is undescribed. The leading geographical outlines of Hudson's Strait will be seen in the accompanying chart, which is taken from Captain Sir Edward Parry's "Journal of a second voyage for the discovery of a North-West Passage from the Atlantic to the Pacific."

(1.) See chart accompanying Captain Becher's paper, published in the Journal of the Royal Geographical Society for 1842.

(2.) Narrative of a voyage to Hudson's Bay, page 41.

longitude

The centre of the eastern passage into Hudson's Strait is in latitude 61 degrees, or about one degree north of Christiana in Sweden or St. Petersburg in Russia. It lies under the 65th meridian. The latitude of the western entrance, between Charles and Salisbury Islands, is in 63 degrees north, and in ~~latitude~~ 76 degrees west.

THE CHARACTER OF THE NAVIGATION IN HUDSON'S STRAITS.

Q. Describe to the Committee the character of the navigation in Hudson's Strait and be pleased to refer to the authorities in full, so that, if necessary, further reference may be made to them?

A. Commander A. B. Becher, R.N., of the Hydrographical Office, Admiralty, read a paper before the Royal Geographical Society, in 1842, intituled "The Voyages of Martin Frobisher." Among much interesting matter relating to the discoveries of Frobisher, the following important passage occurs, which has a practical bearing upon the character of the navigation of Hudson's Strait, sustained by such an eminent authority as Captain Sir Edward Parry.

"George Best has given in his narrative of the voyage a formal dissertation on the general features of the mistaken Strait of Frobisher, in which the proof that it was no other than Hudson's Strait must be looked for. We have already accounted for the ship's having drifted down to the entrance of Hudson's Strait, and it appears that, once within that entrance, the progress to the westward was comparatively easy—a circumstance also observed by Sir Edward Parry. He says (p. 19) : "We continue to gain a great deal of ground, the ebb tides obstructing us very little. Indeed, from the very entrance of Hudson's Strait, but more especially to the westward of the Lower Savage Islands, it was a matter of constant surprise to find our dull sailing ships make so much progress when beating against a fresh wind from the westward."

(1).

Commander Becher, commenting on this passage from Sir Edward Parry's work, says: "Doubtless this facility of getting to the westward induced Frobisher to stand on."

The tides rise within the Straits to a height of about thirty feet during neaps, according to Sir Edward Parry; during springs, they must have at least from eight to ten feet greater range. It is this feature of high tides and the resulting strong currents which have great influence upon the formation of ice in the Straits and prevents them from freezing across.

In 1814, Lieut. Edward Chappell, R.N., of H.M.S. "Rosamond," visited Hudson's Bay, and in the narrative of his voyage, published in 1817, he pointedly adverts to the advisability of merchants sending a strongly built brig into Hudson's Strait *early in the month of June*, so as to reach Cape Saddleback before the Company's ships arrive, with a view to trade with the Esquimaux of those coasts. He also states that a vessel intended for this trade should not remain later than the beginning of October in the Straits.* The period included between "early in June" and the "beginning of October" within the limits of Hudson's Strait, sufficiently establishes the fact that, in the opinion of Lieut. Chappell, as derived from practical observation in the "Rosamond," and a careful study of the subject, the navigation of the Straits is safe for a "strong brig" for a period of about four months, or during June, July, August and September—say from the 10th June to the 5th October, or four lunar months. If for a "strong brig" we substitute a strong steamer like a Newfoundland sealing-steamer, and fit her with modern and really inexpensive magneto-electric lights for night work, the difficulties Lieut. Chappell encountered would be vastly diminished, and very probably, an additional ten days added thereby to the season for navigation in October, making the period exceed four calendar months, for Lieut. Chappell states that *it is not to be expected that ships*, during their

(1). Becher on the Voyage of Martin Frobisher. Royal Geographical Society, 1842, page 12.

*Narrative of voyage to Hudson's Bay on His Majesty's ship "Rosamond."—By Lieut. Edward Chappell, R.N., London, 1817.

return to Europe from Hudson's Bay, will ever meet with loose ice; that is with floe or pan ice. He is writing of the Hudson's Bay Company's ships, which are stated to start from York Factory homewards by the 20th September, and so exact is he in his statements that ice is not to be expected to be met with by sailing vessels on their homeward voyage, that he enumerates the different kinds of work done on arrival at York Factory close to Port Nelson in the following words:—

"It is not to be expected that ships, during their return to Europe, will ever meet with loose ice; (1) therefore, as soon as our ship anchored on York Flats, *undid* all the preparations which had been made for manoeuvring, whilst amongst the ice; such as re-stowing our anchors, and putting below ice-ropes, ice-anchors, ice-axes, &c.; and we rejoiced in being rid of them."

This is a most important consideration in relation to the navigation of the Hudson's Straits in the fall of the year. In fact, it reduces ice precautions to the early or summer voyages only, and besides conferring unexpected safety upon the homeward voyage, it prolongs the season of navigation, so that steamers may remain at York Factory or Port Nelson until the new ice begins to be formed about the harbor or mouth of Nelson River. The use of the magneto-electric light, on approaching either entrance to the straits, or the establishment of land signal stations there, provided with powerful magneto-electric lights, would greatly assist in promoting safe and speedy navigation during the long nights of the fall of the year. In June and part of July there is little or no night.

Once within the eastern entrance, the Straits are seen to expand into a broad open Bay, well known as Ungava Bay. Green Island lies about half way between the North or Terra Nivea shore and Akpatok Island, at the entrance to Ungava Bay, the clear sea way on either side of Green Island being about 50 miles in width. In traversing the Straits, Ellis says; "If I have to give any directions for avoiding the thickest of the ice in these Straits, it would be to keep pretty near the North Shore, for we always observed that side much the clearest, as not only the winds blow mostly from thence, but currents too come out of most of those large openings which are on that side." (2)

Robson, in his "Account of Hudson's Bay," (3) conjectures that a safe passage may often be found through Hudson's Strait in the beginning of June, before the ice breaks up in the Bay and is carried by winds and currents into the Straits. He argues that the ice of the bottom of the Bay, the north ice and the west ice, will not have time to reach the Straits; "but after June all the Bay ice commonly reaches it." "The beginning of June, therefore, seems to be the likeliest time in which to expect a free passage."

On the other hand, Sir Edward Parry, R.N., states in his narrative of a "Second voyage for the discovery of a North-West Passage," that the Master of the H. B. Company's ship "Prince of Wales," considered that he had arrived at the entrance of Hudson's Straits too early, on the 16th July, for advancing to the westward, and "strongly insisted on the necessity of first getting to the northward or inshore before we could hope to make any progress, a measure, the expediency of which is well known to all those accustomed to the navigation of icy seas." (4) But this view does not militate against the opinion that the entrance to the Straits might have been easily effected a month or six weeks earlier, before the ice broke up in Hudson's Bay, or more probably Fox Channel, and began to come down the Strait.

Mr. Davidson, the Master of the H.B. Company's ship "Prince of Wales," informed Sir Ed. Parry that after reaching and leaving the headland called the North Bluff lying immediately above the Savage Islands, about the middle of the Straits, they seldom

(1) "It is astonishing, that, before the return of the ship, the whole of the drift ice in the Straits disappeared."

(2) A voyage to Hudson's Bay by the "Dobbs Gallery" and "California" in the years 1746 and 1747; by Henry Ellis.

(3) An Account of Six Years' Residence in Hudson's Bay from 1733 to 1736, and 1744 to 1747; by Joseph Robson, Surveyor and Supervisor of the Buildings to the Hudson's Bay Company.

(4) Page 12.

met with any very serious obstructions except from a body of ice which they usually have to penetrate near Charles' Island, and which, from the frequency of its occurrence in that situation, has obtained the name of "Charles' Patch." "Long experience," Sir Edward continues, "has brought those who frequent this navigation to the conclusion that in most seasons, no advantage is to be gained by attempting to enter Hudson's Straits earlier than the first week in July, the annual disruption of the ice which occupies the upper and middle parts of the Strait being supposed not to take place till about this time. In the course of one single year's experience in these parts, we have seen nothing to recommend a practice different from that at present pursued by the ships of the Hudson's Bay Company." Here again it will be observed that the remarks are made with reference to sailing ships, and also with regard to the exigencies of the Hudson's Bay Company's trade, which could not be benefitted by an earlier arrival, as their vessels make only one voyage in the season, and their purposes are served if they arrive at York Factory in August.

Parry's expedition found the tides at the Savage Islands, before referred to, to fall at dead neaps 29 feet, the time of high water at full and change being 7.35; no ice was seen by Parry after attaining a westerly position, a few leagues beyond Savage Islands, except one or two bergs.

This distinguished navigator draws particular attention to the fact that the ebb tides which come down the Straits are not so strong as the flood tides which go up it. He says that the ebb tides afforded very little obstruction, and that he was constantly surprised to find his "dull sailing vessels" make so much progress."

Some idea of the difference between the difficulties of going up the Straits in July and returning down the Straits in September, may be inferred from the following comparisons.

Sir Edward Parry entered the Straits on the 6th July, and was abreast of the Upper Savage Island on the 25th and abreast of Charles' Island on the 28th of the same month, being 22 days in effecting the passage. Returning, he was abreast of Charles' Island on the 20th September and passed out of the Straits on the 23rd; occupying three days for the return passage, and reaching the Orkneys on the 9th October, or 19 days in all.

Lieutenant Chappell entered the Straits on the 28th July, and passed Charles' Island on the 22nd August, being 24 days in coming up the Straits. Returning, he left York Factory on the 18th September and reached Cape Resolution on the 6th October; passing from York Factory through Hudson's Bay and Straits out into the open Atlantic in a week. He reached the Orkneys on the 19th of the same month; being 21 days making the homeward voyage.

Both of these officers sailed in the cumbersome old fashioned vessels in vogue half a century since. With a sealing steamer like those now engaged on the Newfoundland and Labrador Coast in the seal fishery, the homeward voyage from York Factory, would probably have been accomplished in 13 to 15 days.

THE ICE IN HUDSON'S BAY AND STRAITS AND ON THE LABRADOR.

Q. State to the Committee the information you have gathered regarding the ice in Hudson's Bay and Strait, also on the coast of Labrador?

A. The extent to which ice forms in Hudson's Bay is not known, but judging from the statements of Hearne, whose opportunities for acquiring information were excellent, ten miles from the shore may be the extreme limit in the deeper and north-westerly portions. The southern part of the bay and the eastern portion probably freeze over a much larger area than the north-western portion, where the water is not only deep, but there are excellent reasons for supposing that a warm under-current comes to the surface there, forming a polynia, as in some parts of the extreme north, such as at the entrance to Smith's Sound, also in Bellot's Straits, and in the Spitzbergen Seas, and on the west coast of Behring's Straits. The cause of these polynias will be found in any of the recent Arctic explorations by sea.

Hearne states that in the northern part of Hudson's Bay and Straits "the sea is frozen over several miles from the shore." He is referring to a statement of the ornithologist Pennant, who, when describing the habits of the Black Gullmots, or Sea Pigeons, remarks that these birds "brave the coldest winters in those parts by keeping at the edge of the ice in the open water." This passage, as illustrating a physical phenomenon of great importance in the navigation of Hudson's Bay in the early summer months, is of especial interest and may be cited at length. "Black Gullmots, known in Hudson's Bay by the name of Sea Pigeon. Those birds frequent the shores of Hudson's Bay and Straits in considerable numbers; but more particularly the northern parts, where they fly in large flocks; to the southward they are only seen in pairs." * * * "My friend, Mr. Pennant, says they brave the coldest winters in those parts by keeping at the edge of the ice near the open water; but as the sea at that season is frozen over several miles from the shore, I believe no one's curiosity ever tempted him to confirm the truth of this, and it is well known they never make their appearance near the land after the frost becomes severe." (1) Hearne had so many opportunities at the Prince of Wales fort, near the mouth of Churchill River, of making observations upon the ice in the north-western part of Hudson's Bay, that his statement respecting the distance it is formed from the coast line may be accepted without fear of exaggeration one way or the other.

The objective point in Hudson's Straits it is desirable to attain at the earliest possible date in the summer is North Bluff, in the rear of the Upper Savage Islands, from which place, as already stated, the Hudson's Bay Company's ships generally take their departure across the Straits into Hudson's Bay. Baffin anchored here in 1615. On Parry's chart, the Savage Islands are represented as a small group, eleven in number, protecting the entrance to North Bay, a deep opening in their roar. In his work is a sketch of the largest island, which he examined and described in 1821. The cliffs of the eastern island rise between four and five hundred feet above the sea, and the highest portion to which Parry ascended, is from six to eight hundred feet above the ocean, hence the group is a conspicuous object, and affords anchorage ground. Here Parry took his observations on the tides, which shewed them to rise, neaps about 30 feet, as stated elsewhere. North Bay in the rear was entirely free from ice.

The great rise and fall of the tides in such a narrow strait, gives color to the statement that ice never forms entirely across it, for it is well known that no agent is so powerful in preventing the formation of ice in northern latitudes as strong and continued tidal currents. Hence the suggestion of Lieutenant Chappell and Robson that Hudson's Straits should be entered early in June, before the ice breaks up in the Bay and is carried into the Straits, acquires special importance in connection with the shelter afforded by the Savage Islands and North Bay. Here, if necessary, steamers might wait for the disruption of the ice in Hudson's Bay, supposing that open water does not exist throughout the winter or in the early spring between Mansfield and the adjacent large island thirty miles distant. It is, however, extremely improbable that at this entrance to Hudson's Bay, where the water is deep, ice forms a continuous barrier at any period. The statement of Hearne that in the northern parts ice forms only "several miles" from the shore, is entirely opposed to this view, and conjointly with the great range of the tides it may reasonably be supposed that the ice seen a month later in the season consists of ice drifting easterly. Captain James alleges that where he wintered, in the southern part of James Bay, ice was formed as far as the eye could see. This is very probable, for James Bay, though much further to the south, is very shallow and its waters for miles from the shore are brackish only.

6 Q. Have you any information respecting the time when the Hudson's Bay Company's ships succeeded in passing through the Straits.?

(1) A journey to the Northern Ocean by Samuel Hearne. Page 429.

A. The following table shows the earliest dates given by Lieut. Chappell, R.N., of the arrival of the Hudson's Bay Company's ships at the western extremity of Hudson's Straits or abreast of Charles' Island, between the years 1773 and 1813 in the slow sailing ships of that period :—

Year.	Date of arrival abreast of Charles' Island.
1808	July 20th.
1810	July 21st.
1804	July 28th.
1797	July 29th.
1793	July 29th.
1785	July 31st.
1796	Aug. 1st.
1806	Aug. 1st.
1802	Aug. 4th.
1794	Aug. 4th.
1789	Aug. 4th.
1774	Aug. 6th.
1805	Aug. 9th.
1809	Aug. 16th.
1791	Aug. 19th.
1799	Aug. 19th.
1784	Aug. 21st.
1780	Aug. 21st.
1799	Aug. 22nd.
1798	Aug. 22nd.
1807	Aug. 22nd.
1783	Sep. 2nd.
1811	Sep. 13th.

These dates of the arrivals of the Hudson's Bay Company's ships at the different posts in Hudson's Bay, afford no criterion from which a judgment may be formed of the navigation of Hudson's Straits. This will appear from the following considerations :—

*Firstly,—*They were, in former times, and until the introduction of superior vessels or steamers, slow sailing merchantmen.

*Secondly,—*During the greater portion of the period covered by their annual voyages they were convoyed by war vessels and subject to the inevitable detentions and precautions incident to a time of war.

*Thirdly,—*No object could be gained by early arrival of sailing vessels at the western entrance to Hudson's Bay, since but one voyage each year to and fro was all that was required by the exigencies of the trade.

DANGER ARISING FROM ICE.

7 Q. Have you obtained any information you can offer the Committee regarding the dangers arising from ice;

A. Sir Edward Parry states that "the effects to be apprehended from exposure to the swell of the main ocean constitute the peculiar danger of first entering the ice about the mouth of the Hudson's Straits, which is completely open to the influence of whole Atlantic. A very inconsiderable quantity of loose ice is sufficient to shelter a ship from the sea, provided it be closely packed; but when the masses are separated

by wind and tide, so as to admit the swell, the concussions soon become too violent for a ship, strengthened in the ordinary way, to withstand for any length of time. On this account, it is prudent not to enter the ice without a fair prospect of getting seven or eight leagues within the margin. For the same reason, also, when likely to be beset near the sea, it is better to make a ship fast to small than to large pieces, in order to avoid the heavier concussions occasioned by the latter."(1)

The Newfoundland, the Dundee and the Norwegian sealing steamers, being properly protected, push their way into the apparently illimitable fields of ice in March and April in pursuit of seals, seeking the ice, for it is there only that they can capture the seals. There are now five and twenty sealing steamers of large size in Newfoundland waters, and during the past ten years they have nearly driven the sailing sealing craft from this, formerly styled, hazardous enterprise. It is not unreasonable to suppose that at the present day, when ice navigation is so thoroughly understood, not only by the captains of sealing vessels, but by steam whalers, that the passage through Hudson's Strait, successfully accomplished for 200 years by bulky and unwieldy sailing vessels and vessels of war, should now become an easy problem. Two, and often three, Hudson's Bay ships have, for a period of nearly two centuries, annually passed through Hudson's Straits and Bay, and for a considerable part of the time they were convoyed by the cumbrous men of war of old times. Numerous whaling vessels have also traversed these waters, and it is announced that this year an American House is about to send again a whaler to that well known ground north of Churchill, Marble Island, and the coast towards Rowe's Welcome, to seek for the reported remains of Sir John Franklin. The French not unfrequently sent vessels of war into Hudson's Bay, and once they destroyed the forts. All these facts show that old-fashioned sailing craft successfully accomplished, for nearly two centuries, for the purposes of a limited trade, a supposed obstructed and hazardous navigation, which the interests of a country as large as the empire of Germany now invite us to encounter with the modern protected steamer, the magneto-electric light, and the experience of trained and skilful men.

I am informed by Mr. Horetsky that the Hudson's Bay Company never lost one of their own vessels until the year 1864, when the "Prince of Wales" and consort went ashore at Mansfield Island, "*with studding sails set.*"

COMPARISON BETWEEN THE ICE ON THE COAST OF NORTHERN LABBADOR AND HUDSON'S STRAITS AND BAY.

8 Q. When on the northern Labrador coast, had you any opportunities for contrasting the condition of the ice on the coast there, with what you had learned respecting the extent and manner of its occurrence in Hudson's Straits and Bay? State also to the Committee the extent to which ice on the coast influences the movements of fish, and affects the fishing industry.

A. It appears certain that some of the popular impressions respecting the icy character of Hudson's Straits and Bay have arisen from the accounts which have been published from time to time of the climate and coast line of the northern Labrador, which is not unfrequently feared in entering the Strait. The descriptions given by the Moravian Missionaries of the dangers attending an approach to that coast as far north as Hebron, before the month of August, are no doubt truthful pictures of realities, as they appeared for the first time to the eyes of the inexperienced landsmen. But the coast line of northern Labrador is the unfortunate recipient of the combined effects of no less than three separate arctic or sub-arctic ice streams.

These are the East Greenland ice stream, the Baffin's Bay and Davis' Strait ice streams, and the Hudson's Strait ice stream. All of these ice-encumbered currents meet in the summer on the coast of northern Labrador, and are the cause of its

(1) Second voyage for the discovery of a North-west passage.—By Captain William Edward Parry, R.N., F.R.S., Page 9.

exceptionally cold climate. The reason why the eastern entrance to Hudson's Strait is encumbered in early summer, arises from the ice of the combined east Greenland and Davis Strait current sweeping in a broad stream past its entrance towards the Labrador coast, on which it is pressed by the earth's rotation.

The effect of the accumulation of ice on the coast of northern Labrador and from very remote regions, is not only to render access there difficult before August, but it shortens greatly the summer season for fishing, the fish only approaching the shore when the ice leaves it. So striking is this effect, that salmon fishing commences at the Hudson's Bay Fort, on the Churchill River, two degrees north of Port Nelson, before it begins on Sandwich Bay on the southern Labrador, and five degrees south of Churchill River in Hudson's Bay. When the Indians and fur-traders are fishing for salmon on the north-western coast of Hudson's Bay, north of Port Nelson, the entire coast of Labrador, during an average of years, is blocked by ice from the Straits of Belle-Isle to Cape Chudleigh, and is inaccessible to fishermen. So important is a correct apprehension of these climatic conditions, as affecting the fisheries, and the accessibility of the coast from the sea, that I venture to introduce a series of tables bearing upon this subject.

Hearne tells us that the salmon fishing season at Churchill begins in the latter part of June; he also mentions the occurrence on that coast of innumerable schools of caplin coming in shore to spawn as soon as the ice leaves the coast. Generally, the caplin precede the cod and the salmon on the Newfoundland and Labrador coast; it is not likely that the habits of this fish have changed under similar conditions in Hudson's Bay.

The following tables show the periods of first arrivals and last catches of cod on the Newfoundland and Labrador coasts. In framing these tables I have been careful to eliminate extreme seasons, for the cod have been known to approach the shore during an exceptionally early season, a fortnight or three weeks sooner than during the average of years. Early and late springs occur in the movements of fish just as regularly as in the movements of migratory birds, or in the leafing and flowering of plants. The salmon and the cod generally come within a week of one another, and the Eskimo of Ukkasiksalik, lat. $55^{\circ} 52'$, have a tradition that the salmon may always be looked for on the day of the first spring tide after the 16th July. In 1875, a very late season, codfish were not taken there before the 7th August; in 1876 they came in on the 20th July, and this accords with the experience on other parts of the coast.

TABLE showing the approximate mean date of arrival of cod, mean date of departure and mean length of the fishing season for cod in North-eastern Newfoundland, Southern and Northern Labrador.

Latitude.	Locality.	Mean Date of Arrival.	Mean Date of Close of Fisheries.	Mean Length of Fishing Season.
NEWFOUNDLAND.				
<i>(Over four degrees of Latitude.)</i>				
47°30'	Conception Bay.....	1st June.	20th November.	
48°20'	Bonavista Bay	10th "	10th "	
48°30'	Notre Dame Bay.....	20th "	10th "	
50°00'	Cape St. John to Par. Point.....	20th "	1st "	
49°30'	White Bay.....	10th "	1st "	
51°00'	Cape Rouge Harbour.....	10th "	1st "	
51°30'	Cape Bonavista to Cape Onion.....	20th "	20th October.	
SOUTHERN LABRADOR.				
<i>(Over three degrees of Latitude.)</i>				
52°00'	Chateau Bay.....	20th June.	1st October.	
53°24'	Batteaux.....	12th July.	10th "	
54°26'	Indian Harbour.....	15th "	1st "	
54°56'	Cape Harrison	18th "	1st "	
NORTHERN LABRADOR.				
<i>(Over three and a half degrees of Latitude.)</i>				
55°14'	Aillik	20th July.	1st October.	
54°57'	Kypokok	20th "	1st "	
55°27'	Hopedale.....	20th "	1st "	
53°30'	Double Island Harbour	22nd "	1st "	
55°52'	Ukkasiksakalik.....	28th "	1st "	
56°33'	Nain	28th "	1st "	
57°30'	Okak	28th "	1st "	
58°30'	Hebron	15th August.	25th September.	
58°46'	Lampson	15th "	15th "	

From this table, imperfect as it is, we may deduce the following law: "Over an area extending northerly from Conception Bay for seven hundred miles, the cod approach the shore about one week later for every degree of latitude we advance to the north."

It is known that the caplin is an inhabitant of seas very much farther north than those washing the coast of Labrador. It is abundant on the South Greenland coast, and visits the northern coast of Norway in incalculable numbers.

In 1877 cod and caplin were taken in abundance by Newfoundland craft in the vicinity of Hebron, not far from the entrance to Hudson's Straits, about the 15th August. That the caplin occurs in immense schools in Northern Hudson's Bay has long since been noticed by Hearne and others. This fish is also in abundance on the coast of South Greenland, but the point to which especial attention is directed as regards the movement of the salmon, the caplin, and the cod, is the broad fact that the season in Northern Hudson's Bay is so much earlier and so much longer than on the Atlantic coasts of Northern Labrador, where the fishing interests have assumed such imposing proportions.

9: Q. Will you explain to the Committee what you mean by the "rotation of the earth" affecting the ice on the coast of Labrador. State also if this "rotation" exercises, in your judgment, any noteworthy influence upon the climate of other parts of the Dominion?

A. Allusion has been made to the influence of the rotation of the earth pressing the ice-encumbered Arctic currents upon the Labrador coast; while, however, to the effect of this rotation the inhospitable climate of Labrador is mainly due, it is important to bear in mind that the same influence of rotation is the proximate cause of the fertility of the North-West, of the rise of the Isotherms from Winnipeg to Peace River, of the humidity of the great zone stretching from Manitoba to and north of Pine River Pass, and, in a word, of all those genial conditions of summer climate which combine to ensure the political and commercial future of Manitoba and the North-West. This great influence has been too much neglected in seeking for the causes of that singular disposition of climate which the Government explorations have shown to exist up to the sources of the Mackenzie River. The explanation in general terms is as follows:—

The rapidity of the diurnal motion of any point on the surface of the earth from west to east, varies with its latitude. On the sixtieth degree, or about the latitude of Hudson's Straits, the speed of rotation is about nine miles in a minute; in the latitude of Paris it is a little more than eleven and a half miles during the same period, whereas on the equator the motion of any point from west to east is at the rate of eighteen miles a minute. Hence it is that any current, whether of a river or in the ocean, or of bodies of air far above the surface of the earth, moving from north to south in the northern hemisphere, must necessarily remain in the rear of the increasingly rapid terrestrial movement which carries them round, and must consequently deviate towards the west. The arctic current moving generally from north to south, continually traverses, as it gains a more southern latitude, portions of the earth's surface, which are moving with increasing rapidity towards the east, owing to its rotation; the current is, as it were, left behind, being a body possessing a distinct motion of its own, and the result is that it has always an increasing westerly trend, as it progresses towards the equator. The reverse of this is the case with the Gulf Stream, which flows generally from south to north, and is continually attaining parts of the earth's surface, which have a rapidly diminishing motion from west to east, and the tendency to leave it in the rear grows less in proportion, hence its deviation is towards the east or in the direction of the earth's rotation.

In the southern hemisphere, exactly the reverse action takes place. This law of deviation is observed by all moving bodies, such as winds, rivers, balls in motion, etc. Rivers in the northern hemisphere flowing from north to south eat away the west bank, whereas rivers flowing from south to north attack the east bank. Rivers flowing from east to west have their currents accelerated, and from west to east retarded, because they flow respectively with or against the motion of the earth. Winds flowing north always trend to the eastward. Winds flowing south always trend to the westward.

The Labrador current is thus affected by the rotation of the earth, which causes it to press upon the coasts, and as it rounds capes this pressure is removed, which causes at once strong local currents to the westward, the cause it is feared of many shipwrecks and the loss of life, especially in vicinity of Cape Race, Newfoundland, and in a less degree Cape Sable, N.S. The effect of winds from the Pacific on the valley of the North Saskatchewan I should wish to describe, after having noticed the geographical position of the Great Fertile Belt, which has been ascertained to exist so far to the North-West.

10. Q. Will you repeat to the Committee the conclusions you have deduced from the statements advanced?

A. Reviewing the statements advanced, the following conclusions appear justifiable from the premises.

1st. The season on the coast of Northern Labrador, south of Hudson's Straits is from six weeks to two months later than the season on the coast of Hudson's Bay at and for

some distance north of Port Nelson. This is established by the testimony adduced in relation to the approach of fish to the shore wholly apart from other considerations.

2nd. The only hindrance to an entrance into and through Hudson's Straits, early in June, arises from the obstruction presented by the two ice streams coming from East Greenland and Baffin's Bay, down the west coast of Davis Straits. It is reasonable to suppose that these ice streams are less encumbered late in May or early in June than in July.

3rd. The Straits once entered, the chief difficulty is over, and if entered before the ice comes down, as alleged from Hudson's Bay, Bluff Head may be reached, and a new departure taken, as suggested by the authorities quoted.

4th. It is doubtful whether the northern portion of the Bay ever freezes more than "several miles" from the shore, and it remains to be seen whether much or indeed any ice does come out of Hudson's Bay. It is probable that the ice spoken of as coming from the Bay, really comes down Fox Channel as shewn by the drift of H.M.S. "Terror," represented on the accompanying Admiralty chart. There are two reasons for supposing that very little ice comes from Hudson's Bay; the first is, it would imply the constant occurrence of strong southerly winds and a considerable space of time to carry the ice from so large a surface as Hudson's Bay through the confined channels leading into Hudson's Straits, and experience teaches that ice is rarely met with after passing Charles Island, except towards the centre of the Bay. Moreover, from the description of the ice met in Hudson's Straits, it is largely composed of hummocky, or heavy arctic ice, which comes down Fox Chaunel from the north. It is more probable that the Hudson's Bay ice melts and disappears within the limits of the Bay itself. The second reason is that the early opening of the ice on the west coast of the Bay, admitting the salmon and caplin to the shores in the latter part of June, even so far north as Churchill, and six weeks before the Northern Labrador is free from coast ice, appears to show that local dissolution is the chief if not the only cause of the disappearance of the Bay ice, and its remnant is occasionally found in the eddy near the centre of the Bay in July. If the Bay ice found its way into Hudson's Straits these would be most liable to be blocked up between Mansfield and Digges Islands, but this part is represented to be always clear.

It may, with great propriety, be asked: why should a patch be found near the centre of the Bay? If the Bay ice drifts out into the Straits, would not the ice under such circumstances be found near Mansfield Island instead of at the centre of the Bay. Why does the central patch not follow the stream?

Hence the greater reason for adopting the suggestion of Lieutenant Chapell, and entering Hudson's Straits early in June, before the Arctic ice from Fox Channel comes down, as shown by the "Terror's" drift.

5th. At all points of the route through Hudson's Straits and the entrance to Hudson's Bay where ice accumulations are met with, the channel, never exceeding 45 miles in breadth, is sufficiently near for telegraphic communication by means of magneto, electric lights from one side to the other, so that instant advantage can be taken of information conveyed respecting the condition of the ice in the early summer. In a tideway, where the tides rise at neaps 30, and, at springs, 40 feet, and where the daily swing of the tides is from 12° to 20 miles, carrying ice backward and forward through that space twice every day, fresh channels are constantly opening, which a sealing steamer can avail herself of, but which are useless to a sailing vessel, except with a fair wind.

THE CAPLIN.

11. Q. Will you now supply the Committee with any information you may have gathered regarding the fish of Hudson's Bay, and the deductions you would draw from their habits and relations?

A. In Hearne's account of "a journey from 'Prince of Wales' Fort, in Hudson's Bay, to the Northern Ocean," (1) he notices the occurrence of caplin in Hudson's Bay in extraordinary numbers. The relation of the caplin to the cod is so intimate that the presence of the one may be said to predicate the existence of the larger predacious fish in their immediate vicinity during the spawning season.

While Hearne does not enumerate the cod among the fish he names as being found in Hudson's Bay, he states that although he never heard of one being caught with a hook, "nor ever saw an entire fish of that description in those parts, their jaw-bones are, however, frequently found on the shores."

He states that the caplin "in some years resort to the shores near Churchill River in such multitudes to spawn, and such numbers of them are left dry among the rocks, as at times to be quite offensive. In other seasons they are so scarce that hardly a meal can be procured."

There can scarcely be room for doubt that the caplin visiting the shores of the Bay near Churchill River, are driven shorewards by predacious fish. The caplin spawn, on submarine beaches, from the strand to a depth of thirty fathoms, and perhaps more. In all seas where caplin are observed in large numbers, the schools are pursued during the spawning season by cod and other predacious fish, besides whales, porpoises, &c., &c. The fact of cod-fish being sometimes found on the beach, and their jaw-bones frequently seen on the shores, shows their presence there, and it is scarcely probable that where their favourite food, at a certain season of the year, is present in great abundance, the cod should be absent.

Hearne enumerates also three or four other sources of food upon which the cod depend for a subsistence on the Labrador coast and on the Atlantic shores of British America, namely : "mussels, crabs, starfishes, whilks, periwinkles, cockles, scallops, and many other kinds which are found on the beaches in great plenty." Hearne could scarcely have made a better enumeration of the general food of the cod than he has given us in his narrative, and the only conclusion which suggests itself in relation to his remarks upon the cod, is that this fish not being an article of commerce in Hudson's Bay, has never yet been sought for there. Where the food of the cod is stated to be in great abundance, it is more than probable that this voracious fish will be relatively abundant. (2)

SALMON.

The season for salmon in the neighbourhood of Churchill River, begins at the latter part of June and ends about the middle or latter end of August, according to Hearne. (3)

This writer states that in some years salmon are so plentiful near Churchill River, that he has known upward of two hundred fine fish taken out of four small nets in one tide, within a quarter of a mile of the Fort. If Hearne be correct in his statement that the season begins "the latter end of June," it is a fortnight or three weeks earlier than the season for salmon at Ukkasiksalik, between the Moravian Missionary stations Hopedale and Nain on the Labrador, and not more than 300 miles north-west of the Straits of Belle-Isle. There the salmon are always expected at the first spring tide after the 16th of July, and the cod generally approach the coast about the same time as the salmon. Indeed, it may be stated, that if Hearne's statement be correct, the commencement of the fishing season on the north-west coast of Hudson's Bay, is as early as at any part of the Labrador coast north-west of Hamilton Inlet, and since the movement of fishes towards the coast is governed by the disappearance of ice, the inference is just that the coast of North-West Hudson's Bay is free from floe ice as soon as the coast of the northern Labrador. (4)

(1) In the years 1769, 1770, 1771 and 1772.

(2) The habits of caplin and its relation to the cod are treated of at length in Part I, of the paper prepared by the writer for the Halifax Fishery Commission and printed by the Commission, intituled : "The effect of the Fishery Clauses of the Treaty of Washington on the Fisheries and Fishermen of British North America," Parts I and II.

(3) A journey to the Northern Ocean. Page 395.

(4) For tables showing the mean dates of the approach of cod to the Labrador coast, see *ants.*

NELSON RIVER.

12. Q. Have you any information respecting the character of Port Nelson as a harbour, and of Nelson River? Are you in possession of any plan or survey of Nelson River showing its harbour facilities, and the nature of the approaches to it from the sea?

A. In 1782 the French Admiral Perouse, in command of a line of battle ship and two large frigates, anchored at the mouth of Nelson River, not finding sufficient water in Hayes River on which York Factory is situated. Hayes River articulates with the delta of the Nelson, and the Factory is situated on an island.

In Dobson's account of his six years' residence in Hudson's Bay, he gives a plan of about 40 miles of both Nelson and Hayes River, a copy of which is submitted. Dobson holds that Gillam and Seal Islands are by far the most advantageous positions for a Port, and the survey he has published of the lower portion of the Nelson River creates some surprise at the selection of the low flats near the mouth of Hayes River, by the Hudson's Bay Company, which cannot be entered by large vessels, for a permanent establishment. This is explained, however, by the statement that Nelson River is too large for the Indians to venture down in their small canoes loaded with furs. They cannot cross the flats at the mouth of Hayes River to enter the Nelson, and consequently the port is established on the smaller river for the convenience of the internal trade. It is alleged also that Nelson River is not so well adapted for "tracking" in the spring, chiefly on account of lodged ice on its bank. The fact that La Perouse anchored his huge line of battle ship in Nelson River shows that there is no physical objection to this entrance as a harbour, and the soundings given by Dobson prove that in his day vessels drawing 8 or 9 feet of water could anchor at Seal Island which is about 20 miles from the sea. Dobson say: "Is it not astonishing, and past credit, that though they (the H. B. Co.) had a factory before the year 1688 within six miles of the mouth of Nelson River, which is the finest river in the country for trade, and have been in constant possession ever since the peace of Utrecht, they had not in the year 1744 discovered whether a ship could go in and out with safety. As it is the custom of the Bay to represent everything in the worst light, it was confidently asserted that there was no safe entrance till Captain Fowler and I made the attempt in 1745 and found a very fine one. It is not thirty years ago that a ship was lost off Hayes River, for want of knowing that there was a good harbour and safe entrance at Nelson; yet, necessary as this discovery was, if Captain Fowler had not been in the country I question whether I should have had interest enough with the Governor to borrow a boat and obtain leave to make it. It was also confidently asserted that there was no timber upon Nelson River; but when I went up and viewed the banks and creeks, I found timber in great quantities, and very good."(1)

At Seal Island the tides rise, according to the same author, springs eight feet, neaps four feet. Above Seal Island is Gillam's Island, distant 176 yards, with a depth of water from fifteen to eighteen feet; and here Dobson states a vessel may lie safe both in winter and summer. Twenty miles above Seal Island his chart shows the river to be about a mile broad. With the exception of that portion which finds its way into Hayes River, the Nelson throws into the sea the combined drainage of the North and South Saskatchewan, and of the vast extent of country draining into Lake Winnipeg. In fact, the Nelson River receives the waters of an area as large as France and England combined; it is the outlet of the basin of Lake Winnipeg; and must be regarded as a river of the first class.

Ellis states that the Nelson is two leagues or six miles wide at the entrance, with a very good channel about a mile broad, and from five to fifteen and twenty fathoms deep. He states also that it has fish in great plenty and in great variety. (2) During his expedition, the ice of Hayes River, in which his ships wintered,

(1.) Six years' residence in Hudson's Bay. Page 78.

(2.) A voyage to Hudson's Bay by the "Dobbs Galley" and "California," in the years 1746 and 1747. By Henry Ellis.

gave way on the 16th May; and on the 5th June, nineteen canoes laden with furs passed them on their way to York Fort, showing that the rivers in the interior had been open some weeks previously.

Hearne furnishes us with a striking instance of difference between the climate of the sea coast and the valley of Nelson River, a few miles inland. He relates that in the year 1775 "in my passage from Cumberland House to York Fort, I, as well as my Indian companions, killed them (the Teal) in the rivers we passed through as late as the 20th October. At those times they are entirely involved in fat, but delicately white, and may truly be called a great luxury." (1)

This passage shows not only that this species of duck lingers in the Nelson River Valley until the 20th October, but that the route is passable for birch canoes until that date. In this particular it does not appear to be earlier closed by frost than the old canoe route through Rainy River and Lake to Lake Superior. There is this difference in the two routes to be noticed: the Nelson River Valley is a down grade towards the sea, at a rate of about twenty inches to the mile; the Lake Superior route is an up and a down grade rising to about 1,400 feet above the level of the sea before it descends to Lake Superior, which is 600 feet above the sea level. In other words, a traverse from Lake Winnipeg to the sea by the Nelson River Valley involves a descent of 700 feet in about 400 miles, the Lake Superior route an ascent from 700 feet to 1,400 feet and a descent to Lake Superior of 600 feet above the ocean in 350 miles.

PORT NELSON.

13. Q. Will you now repeat to the Committee, in a general form, the deductions you have drawn in relation to Port Nelson as an objective point for communication between the valley of the Saskatchewan and Europe?

A. The geographical position of Port Nelson, when studied with regard to the prospective commercial interests of the North-West and Manitoba, suggests conclusions of a startling character.

Port Nelson is upwards of two hundred miles nearer to the mouth of the Fraser River, one of the projected termini of the Pacific Railway, than it is to Halifax on the Atlantic Coast. In other words, it is, so to speak, already more than half across the continent, within the wide limits of the Dominion. Then again, the distance of Port Nelson from Liverpool is nearly one hundred miles less than Liverpool is from New York. The relative distances measured on the globe being 2,950 miles and 3,020 miles. If two of the Dundee sealing steamers, similarly found, were to start at the same hour in the month of September, one from Port Nelson, the other from New York the probability is that they would arrive on the same day at Liverpool.

Port Nelson lies under the same parallel as Dundee in Scotland, and it cannot escape notice that numerous fine sealing steamers from the Scottish port, have, since the 10th March, been pushing their way among the same kind of ice as that found barring Hudson's Straits, in pursuit of seals. From twenty to five and twenty of those sealing steamers are now engaged in the same pursuit on the coasts of Newfoundland and the Labrador, seeking the ice, whose presence we lament later on in the year. The employment of these, or steamers similarly constructed for summer work in Hudson's Straits and Bay, would afford a wide field for the exercise of that special skill and enterprise which at present finds a temporary employment only in the destruction of half a million sportive creatures—the life of ice-encumbered seas.

But the modern sealing steamer has led the way to the solution of that all important problem which has in view the creation of an ocean port, and an extensive sea-board for the future commerce of the almost illimitable North-West. The skill and experience in navigating the Labrador current, loaded with ice in March and April, which would otherwise gradually die out with the inevitable decline of the seal fishery, will yet attain further development in the greater work of opening half a continent to the industry of millions of men.

(1) A journey to the Northern Ocean. Page 448.

Port Nelson is about 370 miles from the terminus of Lake Winnipeg navigation, near God's Rapids, which are situate some fifty miles north of Norway House at the northern extremity of Lake Winnipeg. From this point the Nelson River reaches the sea through a natural break in the Laurentides, and falls 700 feet in about 340 miles, or at the rate of 20 inches in the mile. A railway, probably not exceeding 400 miles in length, would bring the whole water communication of both Saskatchewan, Red River and Lake Winnipeg into direct communication with the ocean, within a shorter distance from Liverpool than New York, and, as may be inferred from foregoing statements, open to sealing steamers about four months in the year.

Directing attention to the map of the country prepared by the Surveyor-General, showing the agricultural area from Pine River, 2,500 feet above the sea, eastward, it will be seen that a bushel of grain or a hundred weight of beef, started from Pine River, would move on a descending grade to the ocean at Port Nelson, in the same time that another bushel of grain or hundred weight of beef would reach the Lake of the Woods, and actually might be in Liverpool before its rival in the race had arrived at Montreal, and at far less cost. While the nature of the country admits of a uniform descent to Port Nelson, through a natural break in the Laurentides, the geographical features of the country traversed by the Canadian Pacific Railway from Winnipeg to Montreal compels the passage of the Laurentides where they are 1,300 feet above the sea level, and involves besides numerous subordinate ascents. The sum of the ascents which a bushel of grain or a hundred weight of beef would have to make before reaching Montreal or tide-water between Winnipeg and Montreal is very considerable, while from all along the line from Pine River Pass to the Lower Saskatchewan, thence branching off by a line to Port Nelson, there are no notable ascents, but a down grade all the way.

14. Q. Regarding the map of the North-West Territories issued by the Dominion Lands Office, have you formed any opinions as to the causes of the climatic features which distinguish the areas represented to be suitable for settlement on that map, and extending north-westerly from Manitoba to the Peace River?

A. About three years ago I prepared a chart of British North America, showing the then known distribution of the natural isothermals across the continent.

The data upon which this chart was constructed were chiefly as follows:—

In October, 1872, the results of a great number of observations on and near the boundary line between British America and United States were published under the supervision of Dr. Joseph Henry, Secretary of the Smithsonian Institution at Washington. In the interior of British America, and some years previous to 1872, we had the observations of Blackiston, Hector, Richardson and Lefroy, together with the records of the Hudson's Bay Company. Subsequently to 1872 we have the elaborate discussion of the Rain Charts, Temperature Charts, &c., of the United States and adjoining British Territory, published in the transactions of the Smithsonian Institution; also the observations of the officers of the International Boundary Survey; our own Meteorological Records, reduced and published under the supervision of the Director of the Meteorological Observatory at Toronto; the incidental observations made or collected by the gentlemen engaged in the explorations for the Canadian Pacific Railway; the meteorological notes of various travellers in the far North-West, particularly those of the Abbé Petitot published in Paris.

With the aid of this information, joined to the observations and deductions I was enabled to make, many years ago, from personal observation, as far as the Forks of the Saskatchewan, I constructed the chart of which a copy is now submitted. If you compare this chart, thus independently constructed, with the maps referred to, you will find an extraordinary coincidence between the zone embraced within the isothermals of 33 degrees and 36 degrees, and the great area colored yellow on the map of Colonel Dennis. The well-known agricultural region of surpassing fertility in Manitoba, lies between the natural isothermals of 33 and 36 degrees of temperature, and the zone comprehended within these isothermals sweeps towards the north -

west, and embraces the Valley of Peace River. If a railway were to be projected to the Pine River Pass it would be wholly within its limits, and follow roughly the course of the natural isothermal of 34 degrees from Red River to Peace River.

Now, if the soil be suitable for agricultural purposes, the deduction from the coincidence named and from known facts is, that the climate is tolerably uniform throughout. It is the distribution of heat during the summer months which determines agricultural adaptation. The winter cold of Manitoba is greater than the winter cold on the coast of Labrador; but it is a dry uniform cold, and it is very far less inconvenient to the senses, or in any other way, than the moist cold on the Labrador.

The conditions required for the adaptation of a certain area to agricultural purposes, apart from altitude above the sea and the character of the soil, are generally reduced to two, namely the mean temperature of about 90 days, as during the summer or growing months, and the degree of humidity during that period.

There are, however, two other conditions which exercise a very great influence upon vegetable growth throughout an area extending over many hundred miles to the north-west. These are the measure of the sun's intensity as regards light and heat, and the duration of the length of the day. As we move from Manitoba, say in lat. 50° to Peace River in lat. 56° , this important fact has to be noticed, that the length of the day in summer increases in a greater ratio than the sun's intensity of light and heat diminishes. It is not heat only which affects the growth of vegetation, it is also the duration of solar light in the day. The longer the day the greater the total amount of heat and light which will be received by vegetables. In order to illustrate this important point in relation to the causes which assist in producing the favourable summer climate over that remarkable north-westerly strip extending to Peace River, I submit the following table, showing the sun's intensity and the length of the day on the parallels of 40° , 50° , 60° , during the growing season, or from May to October. (1)

It will be seen from this table that in lat. 40° the sun's intensity is represented by 88 on May 31st, the day being 14 hours 38 minutes long. In lat. 50° the sun's relative intensity of light and heat on the same day is 87, but the day is 15 hours and 50 minutes long. In lat. 60, which is some degrees north of Peace River, the sun's intensity on the 31st May is represented by 85, but the day is 17 hours 26 minutes long. During the fortnight from June 15th to July 1st, the sun's intensity closely approximates in lat. 40° , 50° and 60° ; but the day is widely different in length, and the heat and light have a longer time to act upon vegetation under the more northern meridians. Thus from June 15th to July 1st, the sun's intensity diminishes from 90 to 88 between lat. 40° and lat. 60° ; the day, however, on July 1st is 14 hours 46 minutes long in lat. 40° ; 16 hours 4 minutes long in lat. 50° ; and 18 hours 18 minutes long in lat. 60° . Great and sudden are the changes at the close of September. While solar intensity is represented by 57 in lat. 40° it is only 36° in lat. 60° , and the day is already 18 minutes shorter in lat. 60° than it is in lat. 40° . The winter there may be said to have begun.

(1.) For further information on the sun's intensity and on the length of the day, reference may be had to tables contained in a paper on "The relative intensity of the heat and light of the sun upon different latitudes of the earth." By L. W. Meech; published in the Smithsonian Report for 1856.

TABLE showing the Sun's Relative Intensity, and the Length of the Day in Latitudes 40°, 50°, and 60°.

	Latitude 40°.		Latitude 50°.		Latitude 60°.	
	Sun's Intensity.	Length of Day.	H. M.	Sun's Intensity.	Length of Day.	H. M.
May 1.....	80	13·46	77	14·30	70	15·44
do 16.....	85	14·16	83	15·16	79	16·56
do 31.....	88	14·38	87	15·50	85	17·56
June 15.....	90	14·59	89	16·08	88	18·28
July 1.....	90	14·46	89	16·04	88	18·18
do 16.....	87	14·34	86	15·42	84	17·42
do 31.....	84	14·08	81	15·04	77	16·38
Aug. 15.....	79	13·36	74	14·18	68	15·24
do 30.....	72	13·02	65	13·28	57	14·08
Sept. 14.....	65	12·22	58	12·32	46	12·46
do 29.....	57	11·44	47	11·36	36	11·26

Passing now to the proximate causes which produce the high summer temperature and humidity of the Peace River District, and thence south-easterly to Manitoba, it may be briefly stated that it is the track of the Aerial Gulf Stream of the North-West, which bears a similar relation to the atmosphere of that part of North America, as does the Gulf Stream to the ocean on its coasts. It is influenced by the same unceasing power, namely, the earth's rotation, and it sheds its climatic influence over the area it traverses.

The warm and moisture-laden winds from the Pacific, moving north-easterly, deposit much of their moisture on the western flanks of the Rocky Mountains. Rising over the summit of the ranges, they are deflected to the south by the combined influence of the earth's rotation and the pressure of the compensating cold winds from the north. The cold winds acquire their maximum influence on the 95th meridian which passes through the Lake of the Woods. Farther to the eastward the isothermals are pressed back by the warm winds from the Gulf of Mexico, which push them to the north-eastward. In both cases the rotation of the earth is a leading cause in determining the course of the fertile zones. These, be it observed, are broad generalizations, subject to numerous local modifications, which affect local climates. The valley of Nelson River appears to exhibit one of these local modifications arising from its low level above the sea. Until within thirty miles of Port Nelson, the canoe route down Hayes River shows little difference in point of climate from the canoe route from Lake Superior where it crosses the height of land. The cause, however, in this case is in part assignable to the difference in elevation above the sea level, which is upwards of eleven hundred feet; this would theoretically produce a difference in temperature equal to more than three degrees of Fahrenheit.

15. Q. Have you any information regarding the climate and soil of any portion of the Nelson River Valley?

A. All accounts agree in stating that the climate of the valley of Nelson River changes greatly as soon as a distance of some five and twenty or thirty miles from the sea is reached. The cold winds from Hudson's Bay lower the temperature in the vicinity of the sea board to a great extent, but thirty miles inland their influence is greatly modified. Reference has already been made to Hearne, who killed teal in the valley of Nelson River as late as the 20th October. In Dobb's account of Hudson's Bay he quotes La France, who stated that "Within four or five leagues of the sea at

York, the cold continued and there was ice in the river in June, when above that they had a fine spring, all the trees in bloom and very warm weather up to the great Fork in the beginning of June."

According to Ballantyne, vegetation in the valley of Hayes River, thirty miles from its mouth, on the 23rd June, was found by him to be in an advanced state, the trees being covered with foliage; and on the 25th June he described the spring to have long begun on Hill River, and "along its gentle sloping banks the country was teeming with vegetable and animal life." This is on the canoe route from York Factory to Norway House, and a little to the south of the valley of Nelson River proper. Oxford House is situated on Holy Lake, and Lieut. Chappell remarks, that owing to the richness of the soil and the geniality of the climate, this place produces a number of excellent vegetables.

Dr. King, who was attached to Capt. Back's journey to the Arctic Ocean, states that at the commencement of this rapid stream (Hill River), half way between York Factory and Norway House, the argillaceous cliffs are seen rising in some places 100 feet above the water level, capped with hills of at least twice that height; and at those parts of the stream where it is expanded to a breadth of several miles, innumerable islands appear, stretching in long vistas, and well wooded, producing scenery of extreme beauty." (1) The occurrence of such deep deposits of drift-clay in this valley are of great importance. The same traveller states that Steel River, the name which Hill River takes after flowing 57 miles, "serpentines through a well wooded valley, presenting at every turn much beautiful scenery, but nothing to equal what is seen along the shores of the former stream. The mouth of Steel River is forty-eight miles from the sea by the winding course of Hayes River, into which it falls.

The brigade of boats for the interior usually leaves York Factory about the end of May, (2) which shows that the rivers are open even in the cold border land within twenty miles of Hudson's Bay. We must bear in mind that ice is often found in the lakes, near the water shed, west of Lake Superior, about the middle of May, and Lake Winnipeg is sometimes impassable at its northern extremity during the first week in June. From these comparisons it will be seen that the character of the Nelson River Valley is of an exceptionally favourable character away from the coast line.

It can scarcely excite surprise that there should be a large tract with a good climate, and great depth of drift clays in the vicinity of the valley of the Nelson River; for the following reasons: first, it is the lowest portion of the whole Basin of Lake Winnipeg, and is constantly under the influence of the drainage waters from three hundred thousand square miles of land, lying altogether to the south of the narrow depression, not, perhaps, more than forty miles broad, through which the Nelson River finds its way.

The great thickness of drift clays upon several of the rivers noticed by different observers, on the canoe route from York Factory to Norway House, must necessarily produce a good soil, and the two conditions, soil and a humid climate, concur to sustain an exceptionally fine forest growth for this region, and an abundance of animal life. It is a curious and very noteworthy fact that Nelson River Valley should be the migrating grounds of very large numbers of deer. The cariboo migrate from south-east to north-east, in this part of the country, on the approach of winter. They cross Hayes River, some thirty or forty miles back from York Factory, in September, moving towards the Nelson in large numbers. How far they go to the north-west does not appear to be known.

(1) Page 267. "Narrative of a Journey to the Shores of the Arctic Ocean, in 1833-34 and 1835, under the command of Capt. Back, R.N. By Richard King, M.R.C.S. London: 1836.

(2) Ballantyne, Hudson's Bay.

The following are the measurements and distances between stations on the present York Factory and Norway House route, according to Thompson, the astronomer and surveyor of the North West Company:—

Stations.	Distance in Miles.
York Factory.....	0
Hayes River.....	52
Steel River.....	27
Hill River to first Fall.....	32
Fall to upper part of River.....	30
Lac de la Savanne.....	7
Jack River (Rivière aux Brochets).....	10
Knee Lake.....	47
Trout River.....	13
Holy Lake (a beautiful sheet of water).....	30
Small Brooks and Lakes on a great plateau.....	50
Brook with Beaver Dam (Each away Man's Brook).....	28
Hare Lake (discharges into Sea River).....	7
Sea River (part of the Nelson).....	35
Play Green Lake (Norway House).....	14
 Total Geographical Miles.....	 372

16. Q. Your enquiries have embraced the natural facilities possessed by a large and distant part of the western portion of the Dominion where settlement is contemplated, for direct communication with the seaboard and the open Atlantic. They also exhibit these facilities in a very promising aspect. But there is still one point on which the Committee seeks for information, namely the best manner of verifying by practical test the correctness of your views on a subject of such vast importance. Have you any plan to suggest by which your statements can be put to this test, in an economical and speedy way, so that the necessary information would be placed in the hands of the Government at an early period?

A: Regarding, in the first place, the ocean communication with Port Nelson, through Hudson's Straits, application might be made by advertisement in Newfoundland newspapers, calling for tenders for the summer service of a first-class sealing steamer, officered by thoroughly competent men, and well found in all particulars. Such a steamer might be chartered to sail from St. John's on the 10th June next, and to sail from Port Nelson on her return voyage, on the 1st or 10th of October, to test the length of the season for navigation by steamers. During the interval between the arrival and departure from Port Nelson, she might be engaged with a competent staff in surveying the approaches to Port Nelson, and the channel of the river as far as or above Gillam Island. If time permitted she might go to Churchill, and obtain information on the voyage, and at the fort there, respecting the fishing resources of the north-western portion of Hudson's Bay, which, according to Hearne and others, is rich in marine life.

She would carry a surveying party with supplies to Port Nelson, whose duty would be to land immediately and begin an exploratory survey of the right or north bank of the river, for a railway. This party would proceed up Nelson River as a main route in "freighters" boats, procured at York Factory, or in boats taken with them from St. John's. They would ascend the main river as far as the mouth of Burnt Wood River, which is about half way between Port Nelson and God's Rapids, at the extremity of Playgreen Lake.

There they would meet another party, organized at Winnipeg, coming down the Nelson River from Norway House. If the Norway House party had succeeded in finding a favorable crossing for a railway between Norway House and the head of Split Lake, the attention of the first party would be wholly devoted to the selection of the best ground in the direction of Port Nelson, on the south side of the river, and

towards Hayes River, the Norway House party working up to the discovered crossing place on the Nelson. The accompanying plan of the Nelson River, from a survey by an officer belonging to the Royal Navy, shows that Nelson River ~~gally~~ has a considerable breadth towards Hayes River, and as the upper part of the last named river is occupied by very thick deposits of drift clays, it is probable there is a considerable area of drift clay land on the south side of the Nelson, but some distance from it.

If, however, no passage across the Nelson, near God's Rapids or elsewhere, could be found, both parties would proceed up stream, one up Burntwood River, the other up Setting Lake, and examine the country for a route on either side of those rivers to the rear of Cumberland House, the party from Port Nelson returning in time to reach the steamer before the 1st October. The supplies are easy matters of detail, with resources at both extremities of the route traversed, and the country watered by a large river, through which freighters' boats have passed over portages already measured and mapped, as shown by red lines on the plan of Nelson River herewith submitted.

The entire results of these explorations could be prepared in detail before the close of the present year.

In conclusion, I may be permitted to state that the following reply to a few enquiries I have recently addressed to Colonel Dennis, in relation to the progress of Manitoba and the North-West, will serve, one would suppose, to convince the most sceptical that the vast area, lying due west and north-west of God's Rapids on the Nelson River, can only be efficiently served by the opening of the Hudson's Bay Route.

The progress of Manitoba, starting into life as it were but yesterday, is a most forcible lever in this enquiry. With the rapidly increasing population of Great Britain and Ireland, now approaching 33,000,000, an urgent demand for new homes must arise within the next ten years. A vast area, if made available and accessible, will be absorbed, particularly where returns can be obtained from the prairie soil during the first year of settlement, and where the natural herbage gives instant indirect means of support. The settlement of a limited wooded area is the work of a decade; the settlement of a fertile prairie region of equal extent is the work of a single year, if accomplished with judgment and ordinary forethought.

(*Memorandum.*)

DEPARTMENT OF THE INTERIOR,
DOMINION LANDS OFFICE,
OTTAWA, 16th April, 1878.

The undersigned begs to reply as follows to the several queries submitted to him a few days back by Prof. Hind, on the subject of settlement, &c., in Manitoba and the North-West.

1. A statement of the quantity of lands so far entered—the greater portion of which is of course in Manitoba, but a considerable quantity is situated in the Territories, and a small portion along the Rainy River, in Keewatin—gives 1,123,155 acres, up to the 31st October last.

2. The Dominion Lands townships surveys not having extended as yet to embrace the Saskatchewan, no return of land settled upon has been obtained from that part of the Territories.

3. The approximate population of Manitoba is 35,000, of which Winnipeg contributes between seven and eight thousand.

4. The number of steamers on the Red River, between Fisher's Landing and Selkirk, is ten, of which seven are large steamers belonging to the Red River Transportation Company. In addition to these, the Hudson's Bay Company have one large steamer running from Selkirk to Grand Rapids, and two steamers, one of which is built of steel, running on the Saskatchewan between Grand Rapids and Edmonton.

J. S. DENNIS,
Surveyor-General.

By Mr. Charlton:—

Q. What is the character of the navigation of the Nelson River; are there many interruptions?—There is the plan of the Nelson River. (Exhibits it and explains.) Nearly at the point where this plan terminates, showing all the portages and interruptions in red marks. This plan is by William Hillyar, Master in the Royal Navy—an official plan made by one of the officers in charge of that Department in the Royal Navy. All the portages and crossings are marked with small red lines; the numbers represent the length and the height of the portages.

By Col. Dennis:—

Q. Would you please illustrate practically, on the section on the wall, the order and facts set forth in the reply which you read?—I think I can describe the matter. The section on the wall describes two profiles. The upper one is an ideal profile of the country from the Pine River Pass to Port Nelson on the one hand, and Bute Inlet on the other hand. The lower section is the actual profile of the Canada Pacific Railway, from Burrard Inlet to Lake Superior. You will observe the distance between Burrard or Bute Inlet and Lake Superior is considerably longer than the distance between Bute Inlet and Port Nelson. That fact is especially shown on this map. (The witness, tracing with his pointer, continued): Here we have Burrard Inlet or Bute Inlet, and an imaginary line of railroad passing through the Pine River Pass, and coming down to the North Saskatchewan, and then going on to Port Nelson. It is now known that the height of the Pine River Pass above the level of the sea is about 2,500 feet, or 1,000 feet lower than the Yellow Head Pass. To bring you to Fort Nelson, which is already more than half-way towards the Pacific—that is to say, the distance between Port Nelson and Gaspé or the extremity of Anticosti—is equal to the distance between Port Nelson and the mouth of the Fraser River. The distance between Fort Nelson and Halifax, N.S., is 200 miles longer than from Port Nelson to the mouth of the Fraser River. The distance of Port Nelson from Liverpool is 2,960 miles, or 80 miles less than New York from Liverpool. That arises from the curvature in the surface of the earth. The argument contained in this paper with regard to this section has a special reference to the lower map prepared by the Dominion Lands Office. The yellow belt shows the very large area of cultivable and partly wooded land, which extends from Manitoba to about the head waters of the Peace River, covering an area of 1,200 millions of acres; every portion, so far as known, is suitable for settlement. Of course, it is perfectly understood that in a wild country of this description there are numerous wild areas which will be, in the course of time, reclaimed; but, taking it as whole, owing to its peculiar climate, a moist one, and its soil, the greater portion of the whole area may be considered as adapted to the purposes of settlement. On this map, which I now put in the circumpolar projection, the position of Liverpool is exhibited, and the several relations between the land route by Port Nelson to Montreal, will appear at a glance.

By Col. Dennis:—

Q. I would like to ask Prof. Hind this question: Looking at the position of Port Nelson with regard to the interior of the United States adjoining the boundary to the south, is it not reasonable to suppose, in the event of the route through Hudson's Bay being found feasible, that a very great portion of American territory also would be served by it in the carrying of products to Europe? Naturally a great portion of the trade of the region drained by the Missouri, will find its way to the south; but there is a large extent of country north of the Missouri, between that river and the boundary a producing country, especially is this the case in the vicinity of Red River, immediately south of the boundary; and I gather, from your argument, that if the Hudson's Bay route is found feasible, it will be the natural outlet for that country, as well as for our own?—Certainly, you will see it much better on this map (tracing the natural routes). Here we have Port Nelson and further south, Selkirk, and there the sources of the Red River, which is a down grade to Port Nelson. In fact here,

within a certain radius, the agricultural capabilities are not very great, but in the west and south, in the valley of the Red River, and on a considerable portion of the Upper Missouri, Port Nelson will be very much nearer than any other port either down the Mississippi or down the valley of the St. Lawrence, or any of the Atlantic ports.

By Mr. Charlton :—

Q. I suppose you could grow cereals on any portion of the Nelson River?—I cannot say. I do not suppose it was ever tried, or that there was any settlement of any description. The Hudson's Bay Company had there only very small posts. I think you will observe on the map a few such posts.

Mr. Charlton asked a question concerning the practicability of raising vegetables in the Nelson River or Hudson's Bay region, and the following was put

By Mr. D. Smith :—

Q. Are you aware that vegetables, such as potatoes, invariably come to maturity at Oxford House and other posts of the Bay?—Nothing more than the statements I read by Dr. King, I think. You will observe that the Oxford House is considerably higher than any part of the valley of the Nelson River, and we know that fact would have exercised a very great influence indeed on the growth of vegetables in a region, so to speak, approaching the limit of culinary vegetable growth.

By Mr. Charlton :

Q. Have you any reliable idea of the cost of chartering a steamer suitable for the navigation of the Hudson's Bay?—No, Sir.

By Mr. McCraney :—

Q. Would it be possible, if the Hudson's Bay route were open, to ship through it, the same season its produce; and, if not, can you suggest any means of obviating that difficulty? As I understand it, there would be a danger of a crop having to be held over a year?—It appears to be a question of mere calculation. The difficulty of the Hudson's Bay route lies altogether in the spring of the year. All the accounts, without contradiction, go to state that in the fall of the year the navigation is quite easy. I gave two instances of the ease with which it was accomplished—one being a war vessel, and the other belonging to the Hudson's Bay Co., both of which passed to York Factory, through the Straits, and amid ice. The question is—might not this fall navigation be continued considerably longer than the 1st of October? No ice interferes to prevent a passage. The only trouble is, the passage being comparatively narrow, the late season of the year renders it dangerous to a certain extent, on account of storms; but, by means of the electro-magnetic light, and lighthouses on two or three points in Hudson's Straits, you would effectually provide against any mishap. The next question is as to what time are the breadstuffs ready for handling in Manitoba. All the crops in Manitoba are in by the 10th September, I believe—I speak under correction. I think the extreme period is ninety days. Now it is a question for consideration whether the crops can be taken down in the meantime and shipped.

*The Chairman :—*I think the harvesting period would cover the whole month of September.

*Mr. D. Smith :—*Yes, so far as the crops are being carried.

By Mr. Lowe :—

Q. With reference to extreme seasons, what is to be said?—Of course, it is as well to look all the difficulties fairly in the face. I have no doubt that, as to ordinary reasons, all the facts stated here are quite correct. I do not know whether those statements would apply to extreme seasons; because I understand that sometimes the Hudson's Bay Company's vessels have not been able to effect an entrance into the Straits at all, and have had to return. I think, therefore, it is important to consider the point of the effect of extreme seasons on this navigation.

By Mr. D. Smith :—

Q. Have you any information as to the times at which the Hudson's Bay Company's ships have not been able to get out to the water through the Straits?—I have no information with reference to their not being able to go out. But you will observe that the argument in this instance does not refer, in the least degree, to sailing ships. It is proposed to introduce the Newfoundland sealing steamers, 25 of which are at present just coming back from sealing voyages among that very kind of ice they expect to meet in Hudson's Straits. The great point is to draw attention to the fact that this steam navigation, now established, will enable a steamer to start early from Newfoundland for the Straits, and that this fact alters the condition of things so entirely as to remove nine-tenths of the objections formerly justly urged against this navigation. That is the point to bring out; therefore, I would beg to suggest that all questions relating to the navigation should have this one point in view always—namely, the capabilities of the sealing steamers as opposed to those of the sailing vessels. If you refer to the different charts you will find that the wind is a great trouble in getting through Hudson's Straits; it is one prevailing north or north-west wind which prevents sailing vessels taking advantage of opportunities, such as openings in the ice; a steamer can take instant advantage of such opportunities and can effect the passage under conditions which would render it absolutely impossible for an ordinary sailing vessel to go through.

*Mr. D. Smith :—*I put that question because I was aware myself that on several occasions the Hudson's Bay Company's ships had not been able to make the trip, and it appeared that after endeavouring to get out—leaving York Factory after remaining only 10 or 12 days—the ships had to return; that is in James Bay. It has been the case also as to other places.

*Witness :—*James' Bay, as you are aware, is totally different from Hudson's Bay. No argument, I apprehend, can be advanced against the north-west portion of Hudson's Bay, as derived from experience and information obtained in the southern portion of James' Bay. All the conditions are so different; the climate in the north-west portion of Hudson's Bay is much earlier than in James' Bay, according to different authorities. James' Bay is singularly shallow and very much exposed to storms and the ice lingers longer there than in the north-western portion. I should be very glad to know whether any special facilities have not been observed in the navigation of the Hudson's Straits with regard to that beautiful steamer now employed by the Hudson's Bay Company, the "Labrador." I had the opportunity of seeing her, and was informed the facilities the Company enjoy now for passing through the ice excited surprise. Should I be trespassing if I asked Mr. D. Smith to state his opinion on this subject?

*Mr. D. Smith :—*I shall be most happy to do so, the more particularly as it was at my instance that vessel was introduced. Certainly this steamer has afforded very great facilities for navigating Hudson's Straits, and those parts of the coast that had sailing vessels, which it had been found were not fit to keep up communication with Hudson's Straits. But I think that, with one exception, they have never missed getting through the Hudson's Straits with their supplies, and bringing out their cargoes from the country. The "Labrador" is very similar to what you describe, and the sealing vessels are well built, strengthened, sheathed and fitted expressly for the purpose of encountering the ice. I am entirely in accord with those who desire to open up communication with the Hudson's Bay, if possible, and I think it would be well worth while attempting whatever could be done to this end, by getting vessels of a fitting character, well manned, to examine every portion of Hudson's Bay and the inland rivers, with a view to ascertain if the thing is possible. What I should be afraid of is the shortness of the season, which, practically, has been found by the Hudson's Bay Company's officers to be only from two to six weeks of open navigation. But I think it very well worth while attempting to open up communication by way of Hudson's Bay with the North-West Territory. Still, I am somewhat fearful it will not be found practicable. I think that, as the Government are sending out a

Geological Survey, it is very fitting this experiment should be made, and those connected with the Geological Survey will, no doubt, be able to give much time to the matter, and information afterwards, supplementing the present store, and rendering it still more beneficial.

By Mr. Charlton :—

Q. Please state whether, in the case of the vessels compelled to return, the cause of the obstruction was the ice, and whether it was met with in James' Bay or the Straits?

Mr. D. Smith :—In Hudson's Straits.

Q. Has the "Labrador" or any other steamer visited York Factory?—I think not.

By Mr. Lowe :—

Q. There remains the question, whether in the extreme seasons which sometimes occur, the Hudson's Straits would be navigable for those steamers?—Of course, we know that Mr. Smith has stated the Hudson's Bay ships are sometimes driven back, from finding the Straits closed. That difficulty may not arise in reference to steamers. In those extreme seas, and when the Straits are more than usually filled with ice, will they be navigable by steamers?—I should doubt very much myself, if they could on all occasions get steamers through. As it is, the Hudson's Bay ships are unquestionably well manned, and they have most experienced commanders, retained for that express purpose, and who have been brought up in the service. I will say further, that the vessels that have been chartered, and not belonging to the Hudson's Bay Company, have been going to Hudson's Bay all the time. A number of them are not in command of men so thoroughly acquainted with the navigation as the men who have been trained and brought up in this service. I should be very much afraid that in certain years it would not be possible to navigate the Straits even by steamers.

By the Chairman :—

Q. Can you, Mr. Smith, inform the Committee the probable cost of chartering a vessel for the season for that purpose?—I really cannot. I may mention further it would require vessels specially fitted for that particular service; they would not be adapted for service elsewhere; they would require to be sheathed, and would be much more expensive and adapted to that special service for the short time that it would be possible to navigate Hudson's Bay. True you might turn them into sailing vessels.

The witness Prof. Hind :—And they might be used in the winter navigation of the St. Lawrence. (Laughter.)

Mr. D. Smith :—I should not speak very positively as to that operation. I had very great pleasure in supporting some gentlemen here, including Dr. Fortin, in their scheme of telegraphic communication through the Lower St. Lawrence; but with regard to the navigation of the St. Lawrence, I am somewhat doubtful. I have spent many winters on different portions of that river, and should not like to be on board one of those vessels, and I am not more timid than most people. (Laughter.) I really do think, if you speak of it as possible, perhaps one year in ten you might navigate the St. Lawrence in winter, but I doubt very much whether you could do it regularly for the purposes of trade. There are many schemes for navigating the Hudson's Bay, and that is one of them. You would require vessels specially fitted for that purpose, and much more expensive than ordinary; and the carrying capacity would be necessarily very limited.

By Col. Dennis :—

Q. Can Mr. Smith tell the probable cost of a vessel like the "Labrador," got out as she is?—She cost some £18,000 or £20,000. sterling. She is a small vessel.

Prof. Hind :—Do you call the "Labrador," a small vessel?—Yes; about 550 tons, and that is small. Her carrying capacity as we have experienced is very small.

Col. Dennis :—I would like, as following up the very pertinent question put by M. McCraney, with regard to the possibility or probability of moving a crop from the North-West, the season of its growth, to ask, under ordinary circumstances, how many days it would take to get clear of the coast from York Factory?

Prof. Hind :—I have got two illustrations—six days to get rid of the coast, actual sailing.

Col. Dennis :—I think it was stated, by some member of the Committee, that crops might be moved down in September; if I remember right, it was said that passages have been made through the Straits late in October. If that is the case, there would be no difficulty in moving the crops the same year. From all accounts, there seems to be no difficulty in the fall of the year in getting through the Straits.

By Mr. D. Smith :—

Q. You do not speak of exceptional years?—No; of course there are always exceptional years. But then the conditions introduced by steam navigation changes matters so thoroughly that you can scarcely compare them with similar conditions when you employed sailing vessels. Take the case of sailing steamers; their manner of proceeding now is totally different from what it was when sailing vessels were in vogue; they have learned now to deal with the ice, and treat it rather as a source of safety than of danger, by pushing into it to make themselves perfectly secure from storms.

Mr. D. Smith :—Perhaps it would not be out of place for me to mention that the Hudson's Bay Company have carried in the great bulk of their supplies by the Straits and have found that it would be very much cheaper to get all their supplies out by Canada and the United States. They have suffered a very considerable loss from ships that they have had to do away with or divert to other purposes. They have given up entirely the introduction of supplies by way of Hudson's Bay or York Factory. Nothing whatever is sent in there by the coast, except for those posts along the coasts.

Q. Would not a railway from Fort Nelson completely alter all that; a great difficulty is getting up the Hayes route, which is a source of expense?—(*Mr. Smith*) No doubt a railway would be of great use, but the season is too short. After you got down there you could hardly expect people to reach Hudson's Bay one year with another, before the middle of October. Mr. Trow knows as much about the Red River and the harvests in it as I do.

Mr. Trow :—I think it would take the whole month of September to get the crops in.

By Mr. Thompson (Cariboo) :—

Q: From information we have received about the time navigation lasts, if this route were established, and a properly equipped line of steamers placed on it, would it not be available for more than one trip each year?—*Prof. Hind*—Certainly? if vessels were prepared for this navigation, they would start about the middle of May from Liverpool, and reach the Hudson's Straits about the 1st June. The statement made by those who have been in the Straits, is that the entrance can always be effected more easily early in June than in July before the ice comes down from Hudson's Straits. Therefore, they would really start from Liverpool, or any other port, in the month of May. If we contrast the experience of bringing out emigrants to the North-West by the Port Nelson route, with that of their despatch by the Northern Pacific Railway, we shall see the advantage of the former, which would require but one transshipment, one railway journey, equal to that from Quebec to Sarnia, and which would land them in the heart of the agricultural region of the west.

Mr. D. Smith :—The experience of the Hudson's Bay Company is, I should suppose, in favour of the statement that it is easier to get into Hudson's Bay in July or the beginning of August than a little earlier. Their vessels do not attempt to leave the North of Scotland till the end of June or the beginning of July. There is

no reason they should not go out earlier if the course were better for navigation. But they have found that it is better not to attempt it. Of course they have tried to go in earlier, but that is their experience, and, of course, they have used sailing vessels.

By the Witness :—

Q. Would there be any difficulty of obtaining a connected series of tables similar to those given by Chappell, of the dates on which the Hudson's Bay Company's vessels sailed from the Orkneys for York Factory or James' Bay?

Mr. Smith :—No difficulty, I presume.

The Witness :—If one could obtain the dates for a period of 200 years, they might prove useful.

Mr. Smith :—I have no doubt the Hudson's Bay Company would be glad to give any information in their possession, and I shall make a point of endeavouring to obtain it. If there are in England any facts on this subject I shall make a point of endeavouring to obtain them. It may be worth while to notice a report as to the discovery lately of some old records in York Factory, records for 100 or 150 years, which were stated to have been sent to the Hudson's Bay House in England. Having asked for information with regard to this matter from England, I find they have no knowledge whatever of any such papers having been found. (Applause and laughter.) The report appeared, I think, in some New York papers, but, so far, the Company have not seen it verified. It may be true, though I know nothing of it.

By the Chairman :—

Q. Can you state, Mr. Smith, in what month or on what day of the month the Hudson's Bay Company's vessels, as a rule, leave York Factory on the homeward trip to Britain?—From the 16th to the 25th of September, I think—I am not sure; or from that to the 1st October. It depends altogether on the time they have been able to get into Hudson's Bay. It is sometimes very late before they get in, and they have to work day and night at the little required to be done there so as to enable them to get out. I think it is towards the close of September.

Q. You never heard of any great difficulty on leaving later in the season; there is no particular hurry to return, only that they are making one trip, and they have to accomplish their task; is it not that they are hurried to get out on account of icebergs?—Unquestionably it is from the difficulty of getting out at all that they are desirous of leaving as early as possible. I have mentioned the fact that it is only in the Straits the difficulty occurs, and in one case they could not get through and had to come back. Still this navigation would be very desirable if it could be found practicable.

By the Chairman :

Q. You have visited the valley of the Qu'Appelle?—Yes.

Q. What is your opinion of its agricultural resources?—Not very favourable as to the southern portion, or that before you get to White Hills.

WINDSOR, NOVA SCOTIA,

June 10th, 1878.

Colonel DENNIS,
Surveyor-General,
Ottawa.

DEAR SIR,—I send herewith the additional evidence respecting the navigation of Hudson's Bay, to which I alluded in April when before the Select Standing Committee on Immigration and Colonization.

I have supplemented my evidence with an outline of a plan relating to the important subject of colonizing the North-West.

The successful prosecution of the whale fishery in Hudson's Bay by Americans appears to afford an important proof of the navigability of Hudson's Straits, even for properly equipped sailing vessels. It shows too, that the waters of Hudson's Bay are frequented by whales during some years in such numbers as to make the whale fishery there a valuable commercial undertaking.

Between the years 1861 and 1874, American whalers took an annual average of \$124,000 worth of that "fish" from Hudson's Bay. About fifty voyages were made during that period (eleven years) in this pursuit, giving an average of rather more than four vessels for each year.

The whaling business in Hudson's Bay has been unobtrusively carried on, and while we hear of the difficulties encountered by the Hudson's Bay ships in their annual voyages through the Straits to York Factory and back to Europe again, we do not hear of risks and dangers encountered by double the number of whalers, because the value of the commercial gain is considered to be worth more than the risk, or else the risk is not great in experienced and skilful hands. Would it not be far less in the Newfoundland sealing steamer?

The following tables relate only to American whalers: we do not know how many British whalers pursued their calling in Hudson's Bay, nor does there appear to be any way of procuring that information.

You will see from the tables that out of forty-nine voyages in Hudson's Bay there were four vessels lost, but not in their passage through the Straits. These vessels were:

The "Pavilion,"	crushed by ice in Hudson's Bay in 1863.		
The "George Henry,"	lost "	" "	1863.
The "Ansel Gibbs,"	"	" "	1871.
The "Orray Taft,"	"	" "	1872.

It is worthy of notice that many of the vessels wintered in Hudson's Bay as shown by the dates of departure and arrival home; also, that they pursued their calling largely nearly the north-western portion of the Bay and that Marble Island is a favourite rendezvous. The presence of so many whales in Hudson's Bay suggests conclusions as to the supply of food for these enormous marine mammals, for where whale food is abundant other forms of life are also abundant. The bearing of this on fish life in Hudson's Bay was adverted to in my evidence.

It is also to be remembered that the returns submitted are those of very recent date. In the early history of the American whale fishery, Davis' Straits was a favourite whaling-ground, and vessels appear to have gone into Hudson's Bay and out again into Davis' Straits; but the records of their catch are given as being made generally in Davis' Straits. Thus it is recorded in Alexander Starbuck's "History of the American Whale Fishery," published by the United States Commissioner of Fish and Fisheries, that in the year 1737, the Davis' Straits fleet from Massachusetts alone must have consisted of between fifty and sixty vessels.

TABLE showing returns of Whaling Vessels sailing from American Ports, Fishing in the Hudson's Bay. Compiled from the Report of the United States Commissioner of Fish and Fisheries for 1875-76.

Name of Vessel.	Class.	To Port or Place.	Date of Sailing.	Of Arrival.	Result of Voyage.	Remarks.
1861.						
Antelope.....	Bark.....	340 Oct. 613 Nov.	31.... do 18.	Oct. 12, do 17, 1863.....	Brls. 1,500 1,205	Whalebone, 24,000 43,900
Northern Light.....	Ship.....					
1862.						
Ansel Gibbs.....	Bark.....	319 April 235 May	15.... do 24.	do 11, 1863..... do 13, 1863.....	Brls. 1,000 661	Brls. 17,580 9,000
Pioneer.....	do.....					
1863.						
Andrews.....	do.....	303 April 336 do 613 do 495 March 160 June	29.... do 21.... do 29.... do 17.... do 16.	do 25, 1864..... do 21, 1864..... do 24, 1864..... do 19, 1863..... do 360	1,046 683 1,270 100	17,150 9,700 20,900 1,200
Daniel Webster.....	Ship.....					
Northern Light.....	do.....					
William Thompson.....	do.....					
Pavilion.....	Brig.....					
George Henry.....	Bark.....	303 May	19.....	.....	.....	Lost in Hudson's Bay.
1864.						
Ansel Gibbs.....	Ship.....	319 March 340 April	16.... 30	Oct. 1, 1865.....	885	12,900
Antelope.....	Bark.....					Lost in Cumberland Inlet, 1868; sent home 375 whale, 1,600 lbs. bone.
Milwood.....	do.....	254 do	24.... do 7	Oct. 20, 1865..... do 1, 1865.....	100	12,400
Black Eagle.....	do.....	311 May	.....	.....	781	.....
Glacier.....	Schooner.....	262 June	21.... do 24	Nov. 13, 1865..... Oct. 14, 1865.....	18	328
Morning Star.....	Bark.....	305 April	9.... do	do 6, 1865.....	1,110	5,500
Orrey Taft.....	do.....	176	.....	.....	472	7,250

TABLE showing returns of Whaling Vessels sailing from American Ports, Fishing in the Hudson's Bay, 1875-76, &c.—Continued.

Name of Vessel.	Class.	Tonnage.	Date Of Sailing.	Of Arrival	Result of Voyage.	Remarks.
					Whale Oil.	Whalebone.
					Sperm Oil.	
Ansel Gibbs.....	Bark.....	303	Dec. 13.....	.....	.....	Lost on Marble Island, Hudson's Bay, October 19, 1872; had 530 whale, 10,000 lbs. bone; saved 3,500. Fifteen of the crew died of scurvy.
Abbie Bradford	Schooner	115	May 28.....	Sept. 7, 1873.....	878	13, 31
Orray Taft.....	Bark	134	July 29.....	Oct. 8, 1872.....	180	3,128
M. E. Simmons	Schooner	105	May .....	.....	.....	Lost on Marble Island, Hudson's Bay, September 14, 1872.
1874.	.....	.....	.....	.....	.....	.....
Abbie Bradford	do	115	do 12.....	Sept. 14, 1875.....	60	650
1876.	.....	.....	.....	.....	.....	12,000
A. Haughton.....	Bark	219	do 23.....	Oct. —, 1877.....	.....	.....

TABLE showing the annual value of the catch of the American Whaling Fleet in Hudson's Bay with the ruling prices of Oil and Bone, for each year, compiled from the Report of the United States Commissioner of Fish and Fisheries, for 1875-76.

Years.	Sperm Oil. Galls.	Ruling Price. \$	Annual Value. \$	Whale Oil. Galls.	Ruling Price. \$	Annual Value. \$	Whale Bone. Lbs.	Ruling Price. \$	Annual Value. \$	Total Annual Value. \$
1861	.....	.....	.....	89,545	0 44 $\frac{1}{2}$	48,747 57	43,900	0 66	28,974 00	77,721 52
1862	576	1 42 $\frac{1}{2}$	817 92	49,952	0 59 $\frac{1}{2}$	29,638 18	26,580	0 88	23,390 40	53,848 50
1863	11,200	1 61	18,032 00	99,168	0 95 $\frac{1}{2}$	94,407 52	48,950	1 53	64,893 50	177,333 02
1864	4,416	1 89 $\frac{1}{2}$	8,398 12	197,936	1 28	255,918 08	90,400	1 80 $\frac{1}{2}$	163,322 66	427,638 86
1865	1,184	2 25 $\frac{1}{2}$	2,769 92	102,336	1 45	148,387 20	51,500	1 71 $\frac{1}{2}$	87,407 22	238,564 34
1866	2,945	2 55	7,499 75	103,520	1 21	125,259 20	49,300	1 37	67,541 00	200,299 95
1867	.....	.....	.....	33,472	0 73	24,646 58	28,700	1 17 $\frac{1}{2}$	15,043 39	39,689 87
1868	.....	.....	.....	20,800	0 82	17,056 00	10,100	1 02 $\frac{1}{2}$	10,352 50	27,408 50
1870	.....	.....	.....	52,880	0 67 $\frac{1}{2}$	35,694 00	22,040	0 85	18,734 00	54,428 00
1872	.....	.....	.....	33,856	0 65 $\frac{1}{2}$	22,172 63	16,259	1 28	20,811 52	42,984 20
1874	1,920	1 59	3,052 80	20,800	0 65 $\frac{1}{2}$	13,572 00	12,000	1 20 $\frac{1}{2}$	14,472 00	31,096 00

Total value of 11 years' Catch \$1,371,023 36

NOTE.—32 gallons of oil are taken as equivalent to one barrel.

With reference to the bearing and influence of the whale fishery, I quote the extract Mr. Starbuck introduces into his voluminous and elaborate history, from the London *Quarterly Review*. It may place the indirect results of a great and hazardous industry in a light very different from that in which we are apt to regard some varieties of private enterprise:—

"The whale fishery first opened to Great Britain a beneficial intercourse with the coast of Spanish America; it led in the sequel to the independence of the Spanish Colonies. * * * But for our whalers we never might have founded our Colonies in Van Diemen's Land and Australia; or, if we had, we could not have maintained them in their early stages of danger and privation. Moreover, our intimacy with the Polynesians must be traced to the same source. The whalers were the first that traded in that quarter; they prepared the field for the missionaries, and the same thing is now in progress in New Ireland, New Britain and New Zealand."

COLONIZATION OF THE NORTH-WEST.

I now venture to submit to your consideration an outline of a plan for the colonization of the North-West. This must be regarded as a preliminary step towards utilizing the facilities which Hudson's Bay affords for bringing the vast area north of the Saskatchewan fitted for the abode of man, and represented on your maps, within the reach of millions of our fellow-countrymen in the United Kingdom and Ireland.

Multitudes there would be glad to exchange a cheerless present and a doubtful future for the hopeful independence which it now appears to be possible for Canada to offer them.

In July, 1867, the date of the Constitution of the Dominion of Canada, the population of the United Kingdom was 30,334,999; in July, 1877, it was 33,444,419, being an increase in ten years of 3,109,420. During the period from 1870 to 1876, both years inclusive, the number of emigrants from the United Kingdom amounted to 1,467,817, and of immigrants to 563,585, the difference showing the actual outflow of population to have been 904,232. Adding this number to the increase of population in ten years given above, the approximate total increase of population of the United Kingdom during the preceding decade amounted to 4,013,652, or 300,000 souls more than the entire population of British North America, including Newfoundland, according to the census of 1871.

If we include the increase of population on the supposition that no emigration had taken place the total would have approached 4,500,000, or equal to the probable population of the Dominion at the present time.

In general terms, it may be stated that, during the last ten years, the population of the United Kingdom and Ireland, with an area of 120,305 square miles, has increased in numbers equal to the present population of the Dominion, in which the area of partly wooded and partly prairie land suitable for immediate agricultural settlement, and at present wholly unoccupied, is certainly as large as the United Kingdom.

A plethora of people in the mother country, and a redundancy of available agricultural land in its nearest dependency, suggests emigration as a remedy especially advantageous to both countries. A close examination of the conditions of either, forces a conviction that such an emigration, on a grand and organized system, must soon become an unavoidable necessity, for it cannot be thrust on one side that the increase of population of the United Kingdom during the past ten years, points to a similar progressive increase during the next decade, which would bring the population of the British Islands to about 38,000,000.

Such a result is, in many ways, so far from being desirable, that energetic steps must be taken to prevent it.

One way of diminishing this prospective but disadvantageous increase may be found in the settlement on joint account of the area of arable land, as large as the United Kingdom, which the Dominion can now offer.

The gradual transference of a redundant population from the British Isles, by joint action on the part of the Imperial and Dominion Governments, may become a means for assisting and hastening the construction of the Pacific Railroad and raising to its proper status and influence the unemployed territorial wealth of the Dominion.

It is quite clear that if the people of the United Kingdom and Ireland, as a whole, are in a prosperous state, with pauperism and local taxation continuing to diminish, or not increasing relatively, it is scarcely probable that a great increase in emigration will take place whatever may be the inducements held out.

In 1873 the total number of emigrants of British origin leaving the United Kingdom reached its maximum, namely 228,345, in 1876 it had fallen to 109,469. The number of emigrants, or people returning home, reached its maximum in 1874, when 118,127 were recorded; in 1876 the inflow was 91,647 and the outflow 109,469, a difference of only 17,822. If even an approach to this relation between emigrants and immigrants were to continue, there would be little hope for a large emigration from the mother country to the Dominion. Commercial depression abroad and commercial prosperity, until recently, at home, have united to check emigration and to promote immigration.

But the signs of the times prove conclusively that the tide is now about to turn, although it may remain for sometime at the stand without forcing itself upon public attention. But when it does turn, the downward rush will be appalling compared with the steady rise.

PAUPERISM IN THE UNITED KINGDOM.

The general reduction in the wages of operatives and labourers in the United Kingdom is a sure precursor of an increase in pauperism and of a wide spread coming demand for emigration. A rapid increase of population with a general decline of wages there, implies pauperism of sudden growth, and as means of relief local taxation or emigration from a country where the land area is extremely small and wholly occupied.

The cost of pauperism is so enormous and its dead weight so burdensome that a plan which promises progressive relief will be sure to meet with due consideration if authoritatively advanced and countenanced.

The pressure of pauperism in the United Kingdom, when estimated by the cost of maintenance, is positively startling. During the past ten years, 1867 to 1876 inclusive, the aggregate amount expended in actual relief of the poor in England and Wales reached £75,850,898 sterling, or more than enough to build two Canadian Pacific Railroads.

In the United Kingdom and Ireland the total amount expended during the same period in the actual relief and management of the poor was as follows :—

England and Wales :—

Expended in actual relief of the poor, 1867 to 1876... £75,850,898

Scotland :—

Expended in the relief and management of the poor,
1867 to 1876..... 8,664,748

Ireland :—

Expended in the relief and management of the poor,
1867 to 1876..... 8,989,884

Total..... £93,505,530

in round numbers \$17,000,000, a sum alleged to be sufficient to build three Canadian Pacific Railways. An enormous sum was raised by taxation and expended during ten years in the actual relief and management of the poor of the United Kingdom and Ireland.

The different classes of people receiving relief during that period form a striking feature in the picture which pauperism presents. The number of adult able-bodied paupers receiving indoor and outdoor relief stands out as a prominent figure. This number varied from 158,308 in 1867 to 92,806 in 1877. The gross annual total of adult able-bodied paupers receiving relief reached its maximum in 1870, when very nearly 200,000 were recipients in England and Wales. In the United Kingdom and Ireland the number of paupers in 1870 was as follows :—

1st day of January, 1870 :—

In receipt of Relief.

England and Wales..... 1,079,391

1st week of January, 1870 :—

Ireland..... 73,921

14th day of May, 1870 :—

Scotland..... 126,187

Total 1,279,499

or about one person in every twenty-five of the population.

In 1877 the total number of paupers was as follows :—

England and Wales..... 728,350

Scotland..... 100,108

Ireland..... 78,525

Total 906,983

or about one in every thirty-seven of the population, after several years of marvelous prosperity. This enormous aggregate cost in 1876 in actual relief, £9,184,570 \$1g. or about \$45,000,000, being double the entire revenue of the Dominion of Canada. The individual cost averaged £10 or \$48 a head.

Now if the cost of pauperism is so great in the United Kingdom, when in one decade the population increased from 30,334,999 to 33,444,419 what will it, in all probability, amount to in years of seemingly approaching commercial stringency, when the population swells at the close of the next decade to 37,000,000? During the last eleven years, from 1867 to 1877, the aggregate number of paupers receiving relief in England were as follows:—

Adult able-bodied paupers,.....	1,611,872
All other paupers (exclusive of vagrants).....	8,573,478
Total	10,185,350

or very nearly one million each year, at a cost of upwards of \$40 for each person. For the United Kingdom and Ireland, it has been shown that the cost amounted to \$48 for each person in 1876.

This is the dark and rayless side of the picture; let us now turn to the bright side and endeavour to win from it some gleams which may lessen the shadows in its reverse.

THE GENERAL PROSPERITY OF THE PEOPLE.

There are two remarkable features to be noticed in relation to the general prosperity of the operatives and labouring classes of the British Isles, namely, that of the condition of the savings banks and the diminution of crime.

The computed capital of the Post Office savings bank in the British Isles rose from £9,749,929 in 1867, to £26,996,500 in 1876. The computed capital of the savings banks under control of trustees rose from £36,533,203 in 1867 to £43,283,570 in 1876. The aggregate of all savings banks being as follows:—

Computed capital in 1867.....	£16,283,232
do 1876.....	70,280,120
Increase in ten years.....	£23,996,888

The decline of crime in ten years is thus shown:—

England and Wales, number of convictions in 1867.....	14,207
do do 1876.....	12,195
Decrease	2,012
Scotland, number of convictions in 1867	2,510
do do 1876	2,039
Decrease.....	471
Ireland, number of convictions in 1867.....	2,733
do do 1876.....	2,344
Decrease.....	389

Notwithstanding these striking illustrations of the increasing comfort among the masses of the people, we are confronted by those demands of helpless poverty which required for its relief in the United Kingdom and Ireland in 1876, £9,184,510,

or upwards of \$44,000,000, and this enormous sum, annually raised by poor rates, is wholly apart and distinct from the very numerous and efficient private charitable institutions.

We may well ask what is the character of the future outlook, with a rapidly increasing population and approaching commercial contraction. If, after years of prosperity, during which vast wealth has been accumulated, it requires \$44,000,000 to keep the wolf from the doors of about a million people, what are we to expect during the coming decade?

The answer is clear. There must be united and sustained efforts to relieve impending distress by emigration, and there is no country which can assist in this necessary work with such advantage to itself and the mother country as Canada.

But in order that joint work can be projected and put into successful execution, an organized system, free from those contingencies to which private speculations are too often subjected, is essential.

The plan which, among others, may be suggested comprehends as a leading feature the Government of the Dominion on one side, and the authorities of the Savings Banks in the mother country on the other side. These institutions coming into direct contact with a class of the population provided with some means, present opportunities for spreading reliable information of a thoroughly practical character among people seeking to better their condition; at the same time they offer a guarantee if their co-operation can be secured against misappropriation and misrepresentation.

The Post Office Savings Banks and the Savings Banks under Trustees are, to a limited extent, subject to the control or influence of the Imperial Government, and any measures sanctioned by the controlling authorities tending to ease the public burdens, and relieve a plethora of population would probably meet with warm and sympathizing encouragement from all parties.

Suppose, for instance, that the Government of Canada were to offer to place at the disposal of the Savings Banks, blocks of land, say 10,000 acres each, previously subdivided into lots of 100 acres, at a price of one dollar an acre, subject to conditions somewhat like the following:

A Government Savings Bank accepts the trust of 100 farm lots of 100 acres each, or 10,000 acres in all, and enters them on its books as Farm Lot Nominations, numbered from 1 to 100 at a price of \$150 or £30 sterling each. A depositor enters his name on the books as a Farm Lot Depositor. When his deposits reach the sum of £30, he receives a certificate of purchase, and a free passage to the Saskatchewan District.*

The costs of a free passage for emigrants by ocean steamers from Liverpool to Quebec, Portland, Boston or New York, is now £6 stg. The sum of £30 to be charged for the nomination to a farm lot of 100 acres in the Saskatchewan District is to be paid by the Savings Banks to the Canadian Government, who convey the emigrants free of charge to his land, and when actually settled there, after a period of one or two years, give a title to the land.

This method would secure not only actual settlement, but conveyance in Canadian steamers and over Canadian railroads. Each one per cent. per annum of the funds now in the Savings Banks thus expended would give an annual income to the Canadian Government of \$3,500,000, on which the charge for transportation, sheds, provisions and supervision, &c., might amount to one half or \$1,250,000, a large portion of which would be spent in the country.

One per cent. on £70,000,000 stg. represents £700,000 or 23,333 farm lots of 100 acres each, or 23,333 emigrants. Assuming that there are 100,000 square miles of territory part prairie and part wooded at present available in the North-West, exclusive of Manitoba, this area would be equivalent to 640,000 farm lots, which would support, five persons to the family, 3,200,000 people, supposing them to be uniformly

* Professor Hind is evidently not aware that the Dominion gives free grants of land in Manitoba and the North-West Territory to actual settlers, to the extent of one hundred and sixty acres to each head of a family; the only money payable by the settler in connection therewith being an office fee of ten dollars.

distributed. If one per cent. only of the funds now in the Savings Banks in the United Kingdom and Ireland were annually devoted to this purpose, it would require 27 years to occupy these lands. The emigrant would have to be conveyed to the District Agencies beyond Manitoba, and south of the North Saskatchewan, through the St. Lawrence Route, which would give a great impetus to the construction of that portion of the Pacific Railway which lies between Lake Superior and Red River and beyond, through the valley of the Assinniboine and Pipestone Creek.

The beautiful map published by the Department of the Interior in March, 1878, and bearing your name as Surveyor-General, contains the following estimates on the subject of available land in the North-West.

	Acres.
" Vast region, generally excellent soil with abundance of wood and water; proved to be admirably adapted to the growth of cereals, especially wheat.....	176,910,000
" Mixed prairie and timber, soil rather light, but produces fair crops, good grazing lands.....	80,000,000
Total of Agricultural land.....	256,910,000"

or, throwing off 910,000 acres, there are according to your estimate, about 400,000 square miles of available agricultural land in the North-West, with no inhabitants, or more than three times the area of the United Kingdom and Ireland, with thirty-four millions of inhabitants crowding one another, and a million of them crying for bread.

The area lying north of the Saskatchewan, watered by the Beaver River, the Athabasca and Peace Rivers, will probably be best reached ultimately by the Hudson's Bay and Nelson River Route.

Time will be required to open out this short cut to the Far West and across the continent.

Until that line of communication is opened, the St. Lawrence Valley will be the route followed.

It is evident that the principle and method outlined in the foregoing sketch can be applied in many different ways. Societies already existing, or formed for the purpose, duly recognized by the Canadian Government, might be empowered to grant nominations to farming lots on similar conditions, the Canadian Government always possessing and retaining the necessary security to prevent misappropriation, by holding the title of the land until one year or more after settlement.

Very truly yours,

HENRY Y. HIND.

OTTAWA, 4th November, 1878.

Colonel DENNIS,

Surveyor General, Dominion Lands,
Ottawa.

DEAR SIR.—In reply to your letter of the 30th October, asking for any information I might possess in reference to the navigation of Hudson's Bay, I can only say that it would afford me very great pleasure to be able to add in any way to the valuable testimony of Professor Hind, given during the last Session of Parliament. I am afraid, however, that I can throw no additional light upon this very important subject. Five years ago I published a little brochure upon the North-West, and at page 5 therein will be found some reference to the navigation of "James Bay." I am

decidedly of the opinion that navigators will always find open water in Hudson's Bay during three months of the year, say from middle of July to middle of October. Regarding the navigation of James Bay, I can only say that there are no good harbours, shoal water being the great drawback.

I observe in Mr. D. A. Smith's evidence before the Select Committee of last Session, the statement that the Hudson's Bay Company's officers have found the season of navigation to last only from two to six weeks. I think Mr. Smith must have misapprehended the facts, as it is within my own knowledge that the Hudson's Bay Company's local coasters (vessels from 20 to 40 tons) perform voyages from East Main to Moose Factory and back during at least two and a half months of the summer, besides being employed for at least a month in attendance upon the London ship, while the latter discharges and takes in cargo.

Mr. Smith also stated that the report of the discovery of some papers or records (relating presumably to dates of arrivals and departures at and from York Factory) was erroneous. Such may be the case, but I feel assured that by writing to Moose Factory we could obtain a copy of such dates and other data extending over a period of at least one hundred years. I can speak authoritatively upon this, as some five entries of arrivals and departures were written by myself in the book to which I refer.

I may mention further that in the year 1875, the barque "Lady Head," a vessel built on the Tyne, and for the West India trade, arrived at Moose Factory, or rather in Moose Roads on the 20th September, and we despatched her on her homeward voyage on the 13th October of the same year. She met with ice in the middle of Hudson's Bay, lost her rudder, and became temporarily disabled. The Captain (James, since dead) erected a forge upon the ice, cut up his best bower anchor with a carpenter's handsaw, manufactured therefrom gudgeons and pintles, rigged a jury rudder, and made sail for London, which he reached in safety after a 29 days' run. These facts are suggestive.

In conclusion, I can only say that in my humble opinion, Prof. Hinds' scheme is perfectly feasible, the more especially when we consider the use of steam vessels, and the rapid strides science is making day by day in the production and management of the electric light.

By the way, reference has been made to the losses sustained by the Hudson's Bay Company in the shipwreck of several of their ships. They never, to the best of my knowledge, lost a ship of their own excepting the "Prince Arthur" and the "Prince of Wales" in 1864, upon Mansfield Island at the entrance of Hudson's Bay. Both of these really fine vessels went ashore one lovely moonlight night at 10 p.m. The weather was beautiful at the time and the ships were carrying studding sails aloft and aloft on both sides. A few hours previous to the accident the Captains of the respective vessels had been interchanging visits, the sea being quite calm, sufficiently so at any rate for ship's boats. They were close to the island, consequently should have known their danger. No lives were lost and a great portion of the cargoes were saved. In the autumn of the same year (1864) the schooner "Martin" arrived at Moose Factory from York with a portion of the cargo of the "Prince Arthur" about the end of October. She reached Moose Factory just in time to be hauled up out of the fast forming ice.

Regretting my inability to enlighten you further.

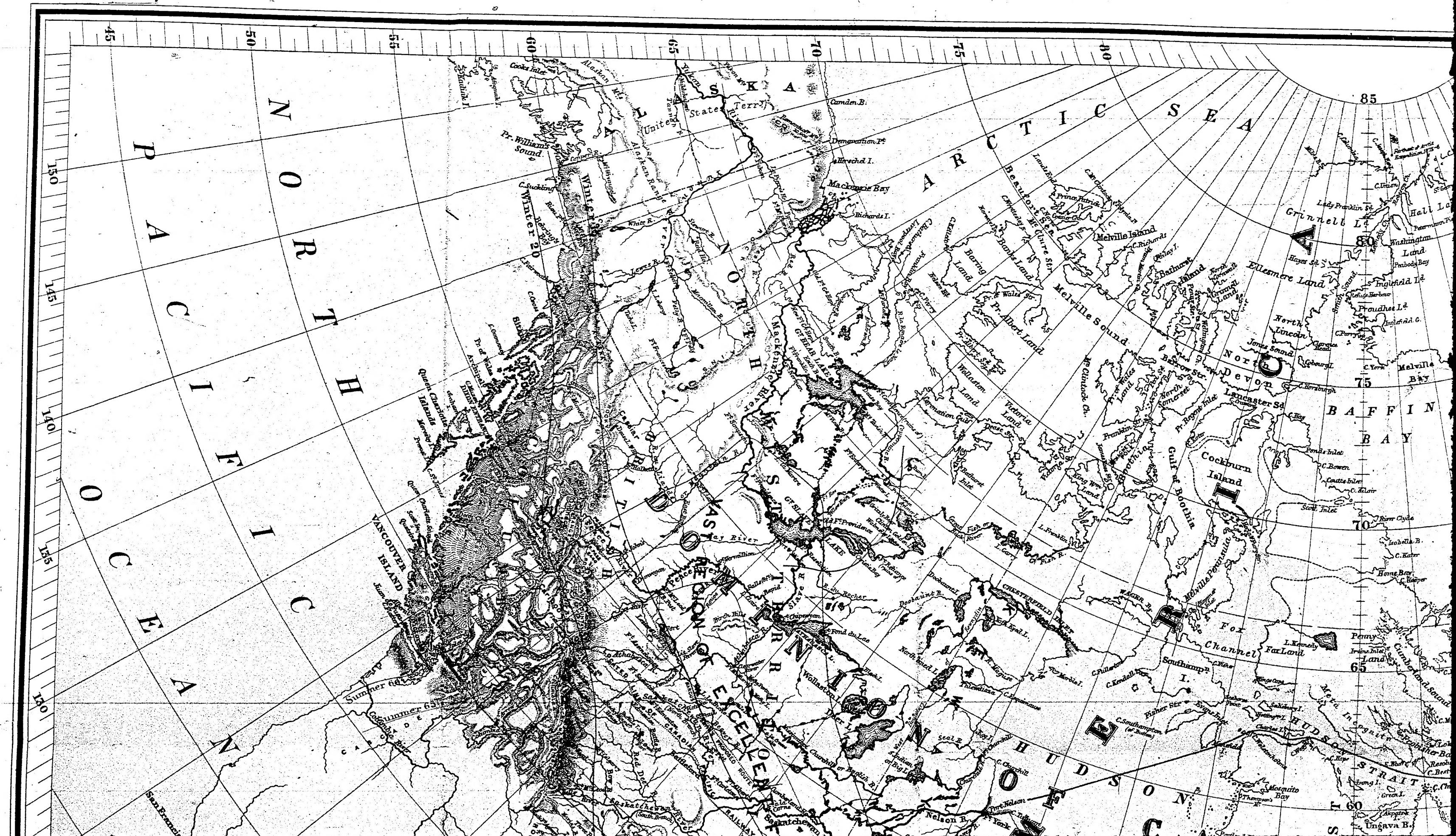
Believe me,

My dear Colonel Dennis,

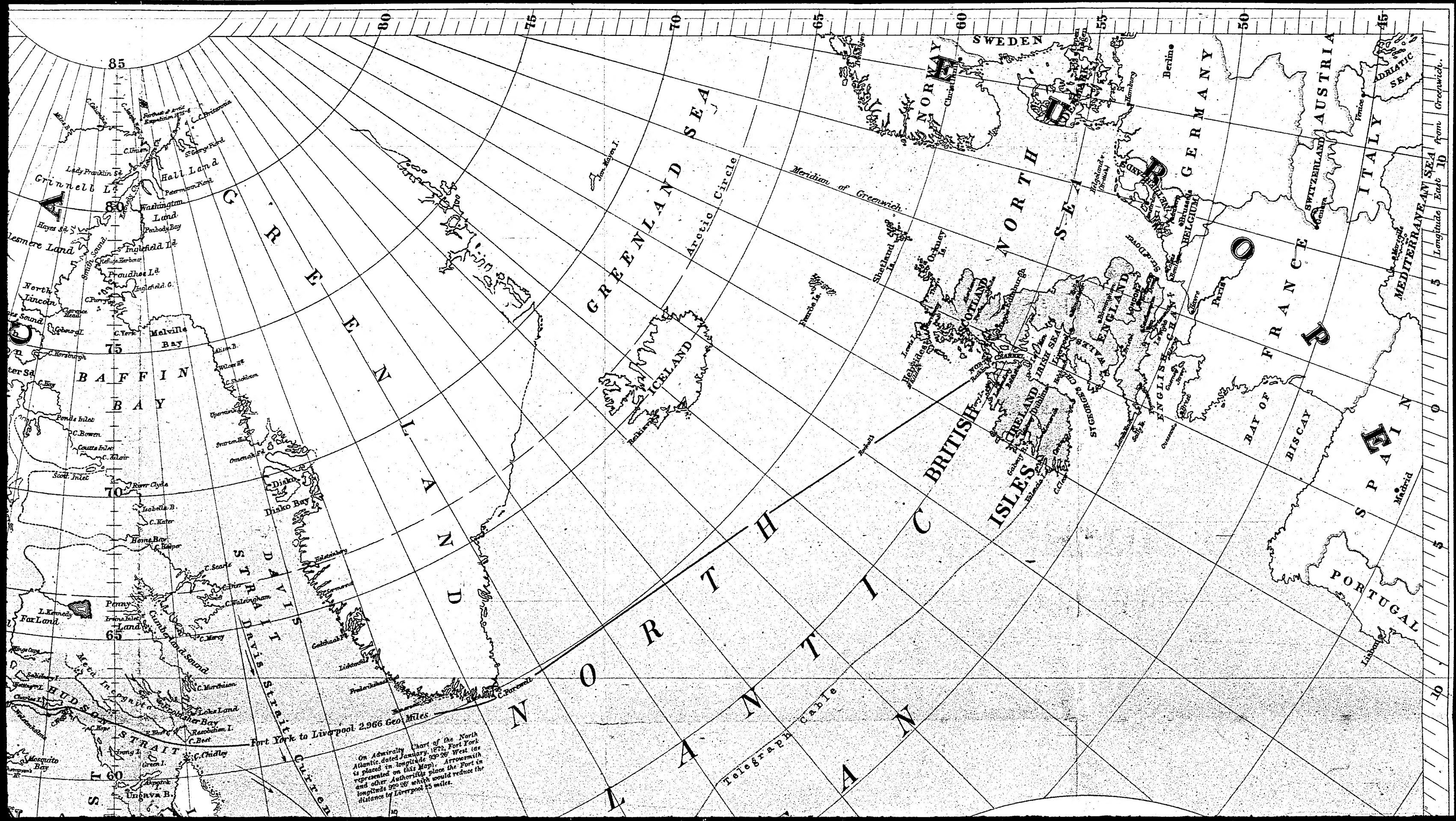
Yours most respectfully,

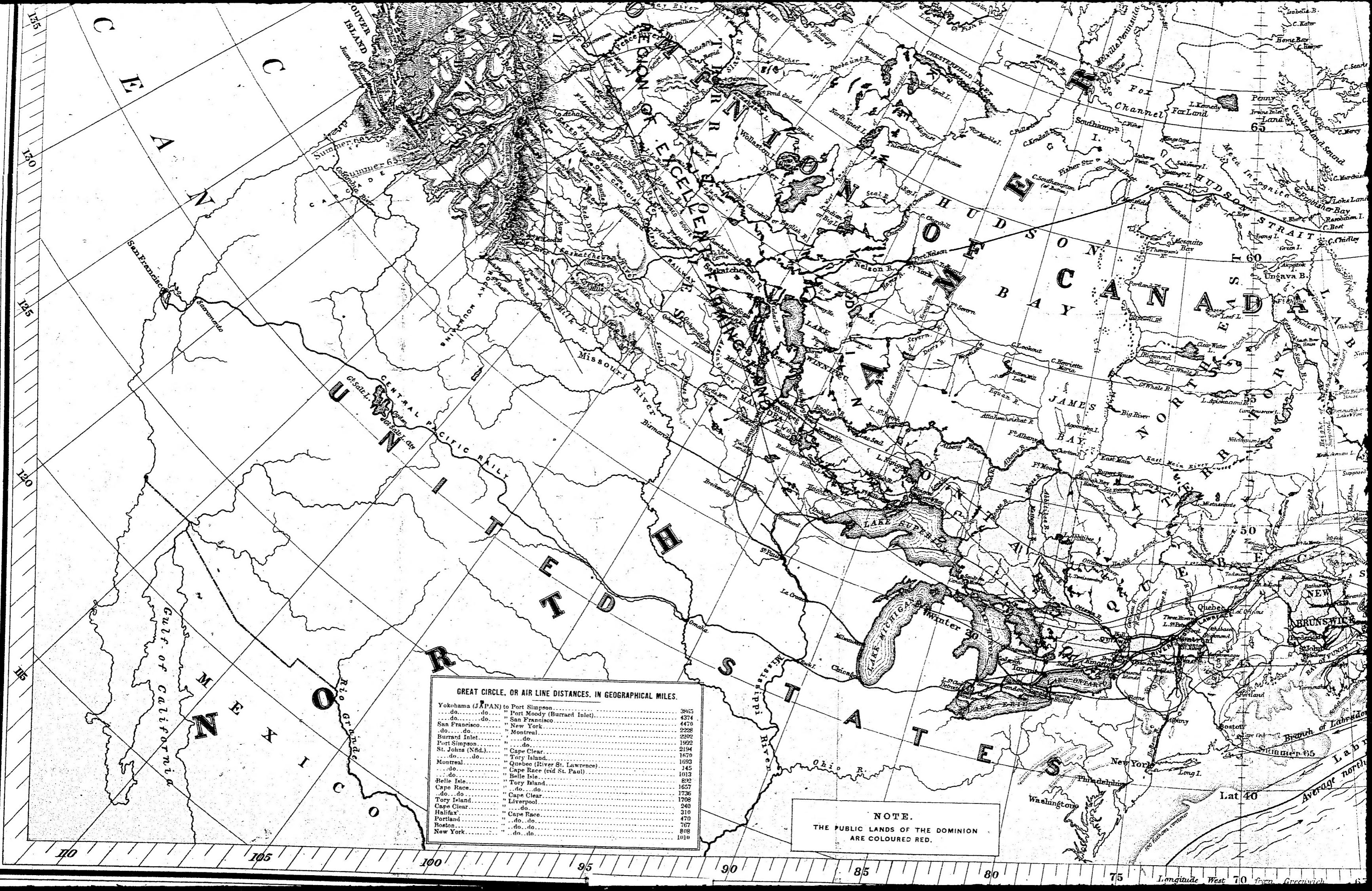
CHAS. HORETZKY.

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MAP OF THE
DOMINION OF
CANADA.
SHEWING THE EXTENT AND SITUATION OF ITS
PUBLIC LANDS,
ALSO ITS GEOGRAPHICAL RELATION TO THE
BRITISH ISLES.

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J. S. Dennis
Surveyor General.

Compiled & Drawn by
J. JOHNSTON, Chief Draughtsman.